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Page 1 of 55

Test Report

Verified code: 380731

Report No.: E20230331478001-2

Customer: Lumi United Technology Co., Ltd

Address: Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

Sample Name: Hub M3

Sample Model: HM-G01E

Receive Sample Aug.02,2023
Date:

Test Date: Nov.16,2023 ~ Dec.04,2023

Reference Document: ETSI EN 300 328 V2.2.2 (2019-07)

Test Result: Pass

Prepared by: Chen Xiaocong
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GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2023-12-29

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20230331478001-2	Original Issue	2023-12-17

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1. TEST RESULT SUMMARY

Test Item	Test mode	Test Requirement	Test Method	Class / Severity	Test Result
1. Transmitter Part					
RF Output Power	Mode 1	ETSI EN300 328 V2.2.2/ 4.3.2.2	ETSI EN300 328 V2.2.2/5.4.2.2.1	Meet requirements: ETSI EN300 328 V2.2.2/ 4.3.2.2	PASS
Power Spectral Density	Mode 1	ETSI EN300 328 V2.2.2/4.3.2.3	ETSI EN300 328 V2.2.2/5.4.3.2.1	Meet requirements: ETSI EN300 328 V2.2.2/4.3.2.3	PASS
Duty Cycle, Tx-sequence, Tx-gap	/	ETSI EN300 328 V2.2.2/4.3.2.4	ETSI EN300 328 V2.2.2/5.4.2.2.1	Meet requirements: ETSI EN300 328 V2.2.2/4.3.2.4	N/A ²⁾
Medium Utilisation (MU) factor	/	ETSI EN300 328 V2.2.2/ 4.3.2.5	ETSI EN300 328 V2.2.2/5.4.2.2	Meet requirements: ETSI EN300 328 V2.2.2/ 4.3.2.5	N/A ²⁾
Adaptivity	/	ETSI EN300 328 V2.2.2/ 4.3.2.6	ETSI EN300 328 V2.2.2/5.4.6.2.1	Meet requirements: ETSI EN300 328 V2.2.2/ 4.3.2.6	N/A ¹⁾
Occupied Channel Bandwidth	Mode 1	ETSI EN300 328 V2.2.2/ 4.3.2.7	ETSI EN300 328 V2.2.2/5.4.7.2.1	Meet requirements: ETSI EN300 328 V2.2.2/ 4.3.2.7	PASS
Transmitter unwanted emissions in the out-of-band domain	Mode 1	ETSI EN300 328 V2.2.2/ 4.3.2.8	ETSI EN300 328 V2.2.2/5.4.8.2.1	Meet requirements: ETSI EN300 328 V2.2.2/ 4.3.2.8	PASS
Transmitter unwanted emissions in the spurious domain	Mode 1	ETSI EN300 328 V2.2.2/ 4.3.2.9	ETSI EN300 328 V2.2.2/5.4.9.2.2	Meet requirements: ETSI EN300 328 V2.2.2/ 4.3.2.9	PASS
2. Receiver Part					
Receiver spurious emissions	Mode 2	ETSI EN300 328 V2.2.2/ 4.3.2.10	ETSI EN300 328 V2.2.2/5.4.10.2.2	Meet requirements: ETSI EN300 328 V2.2.2/ 4.3.2.10	PASS
Receiver Blocking	Mode 2	ETSI EN300 328 V2.2.2/ 4.3.2.11	ETSI EN300 328 V2.2.2/5.4.11.2.1	Meet requirements: ETSI EN300 328 V2.2.2/ 4.3.2.11	PASS

Note:

1. This item does not apply for equipment with a declared RF Output power level of less than 10dBm e.i.r.p, or for equipment when operating in a mode where the RF Output power is less than 10dBm e.i.r.p, the EUT power is less than 10dBm, so it is not applied.
2. It's apply to non-Adaptivity equipment or to adaptive FHSS equipment operating in a non-adaptive mode., the EUT is a adaptive equipment not operating in a non-adaptive mode, so it is not applied.

2. GENERAL DESCRIPTION OF EUT

2.1 APPLICANT INFORMATION

Name: Lumi United Technology Co., Ltd.
Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.2 MANUFACTURER

Name: Lumi United Technology Co., Ltd.
Room 801-804, Building 1, Chongwen Park, Nanshan iPark, No. 3370, Liuxian Avenue, Fuguang Community, Taoyuan Residential District, Nanshan District, Shenzhen, China

2.3 BASIC DESCRIPTION OF EUT

Product Name: Hub M3
Product Model: HM-G01E
Adding Model: HM-G01D
Models Difference: The model NO. HM-G01E & HM-G01D have the same technical construction including circuit diagram, PCB LAYOUT, hardware version and software version identical, except sales area and packaging are different.
Trade Name: Aqara
Power supply: DC 5V/2A or PoE input 48V/0.27A
Frequency Band: 2402MHz - 2480MHz
Modulation Type: Bluetooth LE with 1M & 2M: GFSK
Antenna Type: PIFA antenna
Antenna Gain: -0.5 dBi
Sample submitting way: Provided by customer Sampling
Sample No: E20230331478001-0001, E20230331478001-0003, E20230331478001-0004
Temperature Range: -10 °C ~ 50 °C
Hardware Version: V2.0.5_1060
Software Version: T0
Note 1: The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.
Note 2: All the tests were performed on the model HM-G01E.

2.4 TEST MODE

Test mode 1: BLE fixed transmitting mode

Test mode 2: BLE receiving mode

2.5 FREQUENCY BAND AND THE TEST FREQUENCY

Channel	Frequency (MHz)	Channel	Frequency (MHz)
*00	2402	20	2442
01	2404	21	2444
02	2406	22	2446
03	2408	23	2448
04	2410	24	2450
05	2412	25	2452
06	2414	26	2454
07	2416	27	2456
08	2418	28	2458
09	2420	29	2460
10	2422	30	2462
11	2424	31	2464
12	2426	32	2466
13	2428	33	2468
14	2430	34	2470
15	2432	35	2472
16	2434	36	2474
17	2436	37	2476
18	2438	38	2478
*19	2440	*39	2480

* is the test frequency

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2.6 DESCRIPTION OF ADAPTIVE EQUIPMENT

The type of the equipment	<input type="checkbox"/> FHSS	<input checked="" type="checkbox"/> Non-FHSS		
Adaptive / non-adaptive equipment	<input type="checkbox"/> Non-adaptive Equipment	<input checked="" type="checkbox"/> adaptive Equipment without the possibility to switch to a non-adaptive mode	<input type="checkbox"/>	adaptive Equipment which can also operate in a non-adaptive mode
The equipment has an implemented	<input type="checkbox"/> Frame Based equipment	<input checked="" type="checkbox"/> Load Based equipment	<input type="checkbox"/> non-LBT based DAA mechanism	<input type="checkbox"/> other
Device Class	<input type="checkbox"/> WIFI	<input checked="" type="checkbox"/> Bluetooth Low Energy (5.1)	<input type="checkbox"/> Bluetooth EDR/BR (5.0)	
WIFI Channel Bandwidth	<input type="checkbox"/> 20MHz	<input type="checkbox"/> 40MHz	<input type="checkbox"/> 80MHz	<input type="checkbox"/> 160MHz
Antenna Gain	<input checked="" type="checkbox"/> Antenna1 -0.5dBi	<input type="checkbox"/> Antenna 2 dBi	<input type="checkbox"/> Antenna 3 dBi	<input type="checkbox"/> Antenna 4 dBi
Beamforming Gain	<input type="checkbox"/> Yes, dBi	<input checked="" type="checkbox"/>	No	
Extreme operating conditions	<input checked="" type="checkbox"/> Operating temperature range:	<input checked="" type="checkbox"/>	Min -10°C	<input checked="" type="checkbox"/> Max +50°C
Blocking	<input checked="" type="checkbox"/> PER	<input type="checkbox"/> The manufacturer may declare alternative performance criteria		
Geo-location capability supported by the equipment	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No		

The EUT is Receiver Category 2 equipment.

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3. LABORATORY AND ACCREDITATIONS

3.1 LABORATORY

The tests and measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

Add. : No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District
Shenzhen, 518110, People's Republic of China

P.C.: 518110

Telephone: 0755-61180008

Fax: 0755-61180008

3.2 ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

China	CNAS(L0446)
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Copies of granted accreditation certificates are available for downloading from our web site,
<http://www.grgtest.com>

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4. MEASUREMENTS UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in ETSI EN TR 100 028-1 (i.15) and ETSI EN 100 028-2 (i.8):

Measurement	Frequency	Uncertainty
Radiated Emission	30MHz~200MHz	4.0dB
	200MHz~1000MHz	4.1dB
	1GHz~18GHz	4.9dB
	30MHz~200MHz	3.9dB
	200MHz~1000MHz	4.2dB
	1GHz~18GHz	5.0dB

Measurement	Uncertainty
RF frequency	6.0×10^{-6}
RF power conducted	0.78 dB
Occupied channel bandwidth	0.40 dB
Unwanted emission, conducted	0.68 dB
Humidity	6.0 %
Temperature	2.0 °C

This uncertainty represents an expanded uncertainty expressed at approximately the 95%.

This uncertainty represents an expanded uncertainty factor of $k=2$.

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5. EQUIPMENT AND TOOLS USED DURING TEST

5.1 TEST EQUIPMENT AND TOOLS

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
RF Output Power & Power Spectral density & Occupied channel bandwidth & Transmitter unwanted emissions in the out-of-band domain				
Automatic control unit	TONSCEND	JS0806-2	2018060317	2024-08-04
Spectrum Analyzer	R&S	FSV30	104381	2024-10-13
Programmable constant temperature and humidity test chamber	FC	FPHC-23AW-40	FD202306015	2024-09-10
BT/WIFI System	Tonscend	JS1120-3		
Transmitter unwanted emissions in the spurious domain & Receiver spurious emissions				
Bi-log Antenna	Schwarzbeck	VULB9163	01279	2024-03-05
Horn Antenna	Schwarzbeck	BBHA9120D	02499	2024-08-26
Amplifier	Tonscend	TAP037030	AP20E8060081	2024-04-16
Amplifier	Tonscend	TAP01018048	AP20E8060076	2024-04-16
Amplifier	Tonscend	TAP9E6343	AP20E806065	2024-04-16
Spectrum Analyzer	KEYSIGHT	N9010A	MY55370330	2024-09-08
Spectrum Analyzer	R&S	FSV3044	101184	2024-08-11
Test SW	Tonscend	JS36-RSE/5.0.0.1		
Receiver Blocking				
Signal Generator	KEYSIGHT	N5173B	MY60403029	2024-05-15
Wideband radio Communication Tester	R&S	CMW500	144611-nC	2024-04-16
Test SW	Tonscend	JS1120-3		

Note: The calibration interval of the above test instruments is 12 months.

5.2 LOCAL SUPPORTIVE INSTRUMENTS

Name of equipment	Manufacturer	Model	Serial number	Note
Notebook	DELL	Latitude3400	8RZFJW2	4#
Test board	/	/	/	/
Adapter	Jian Aohai	A70-050200U-EU1	/	/
PoE Adapter	UE	PoE35-54A	/	/

Note: The notebook is just used to produce fixed frequency transmitting.

No.	Cable Type	Qty.	Shielded Type	Ferrite Core(Qty.)	Length
1	Serial cable	1	No	0	0.3m
2	USB-MINI cable	1	Yes	0	1.0m
3	USB-C cable	1	Yes	0	0.8m
4	RJ45 cable	1	No	0	1.5m

5.3 CONFIGURATION OF SYSTEM UNDER TEST

For RF Output Power & Power Spectral density & Occupied channel bandwidth & Transmitter unwanted emissions in the out-of-band domain & Receiver Blocking



For Transmitter unwanted emissions in the spurious domain & Receiver spurious emissions



5.4 TEST SOFTWARE

Software version	Test level
QCOM_1.0	default

6. RADIO TECHNICAL REQUIREMENT SPECIFICATION

6.1 RF OUTPUT POWER

Test Requirement: ETSI EN300 328 V2.2.2/ 4.3.2.2

Test Method: ETSI EN300 328 V2.2.2/5.4.2.2.1

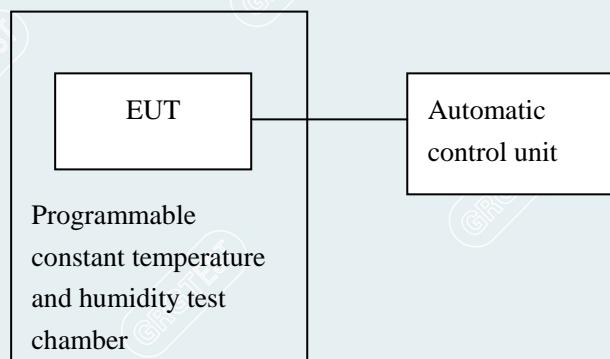
6.1.1 LIMIT

For adaptive equipment, the maximum RF output power shall be 20 dBm.

The maximum RF output power for non-adaptive equipment shall be declared by the manufacturer and shall not exceed 20 dBm. See clause 5.4.1 m). For non-adaptive equipment, the maximum RF output power shall be equal to or less than the value declared by the manufacturer.

This limit shall apply for any combination of power level and intended antenna assembly.

6.1.2 TEST CONFIGURATION



6.1.3 TEST PROCEDURES

Test procedure: Test procedure is according to Clause 5.3.2.2.1 of ETSI EN 300 328 V2.2.2

Test frequency: 2402MHz, 2440MHz and 2480MHz for BLE

Test condition: Normal and extreme test conditions.

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6.1.4 TEST RESULTS

Test environment: Normal condition: 24.1 °C/39%RH/101.0kPa

Extreme test conditions: Low Temp: -10°C

High Temp: +50°C

Test Engineer: Huang Tianmei

Test Date: 2023-11-16

Test Voltage: DC 5V

Test Condition	Test mode	Antenna	Frequency [MHz]	EIRP[dBm]	Limit[dBm]	Verdict
NTNV	BLE_1M	Ant1	2402	3.61	20	PASS
			2440	3.59	20	PASS
			2480	4.11	20	PASS
	BLE_2M	Ant1	2402	3.59	20	PASS
			2440	3.70	20	PASS
			2480	3.97	20	PASS
LTNV	BLE_1M	Ant1	2402	3.62	20	PASS
			2440	3.67	20	PASS
			2480	4.07	20	PASS
	BLE_2M	Ant1	2402	3.58	20	PASS
			2440	3.66	20	PASS
			2480	3.98	20	PASS
HTNV	BLE_1M	Ant1	2402	3.69	20	PASS
			2440	3.71	20	PASS
			2480	4.14	20	PASS
	BLE_2M	Ant1	2402	3.57	20	PASS
			2440	3.67	20	PASS
			2480	3.97	20	PASS

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6.2 POWER SPECTRAL DENSITY

Test Requirement: ETSI EN300 328 V2.2.2/4.3.2.3

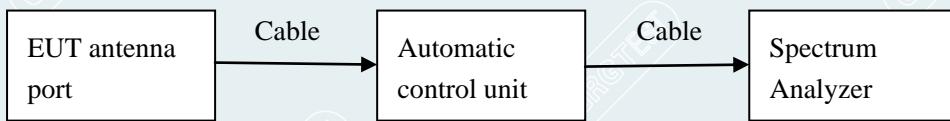
Test Method: ETSI EN300 328 V2.2.2/5.4.3.2.1

6.2.1 LIMIT

This requirement applies to all types of equipment using wide band modulations other than FHSS.

For equipment using wide band modulations other than FHSS, the maximum Power Spectral Density is limited to 10 dBm per MHz.

6.2.2 TEST CONFIGURATION



6.2.3 TEST PROCEDURES

Test condition: Normal test conditions

Test frequency: 2402MHz, 2440MHz and 2480MHz for BLE

Test procedure: Test procedure is according to Clause 5.4.3.2.1 of ETSI EN 300 328 V2.2.2

Remark: /

6.2.4 TEST RESULTS

Test environment: Normal condition:
24.1 °C/39%RH/101.0kPa

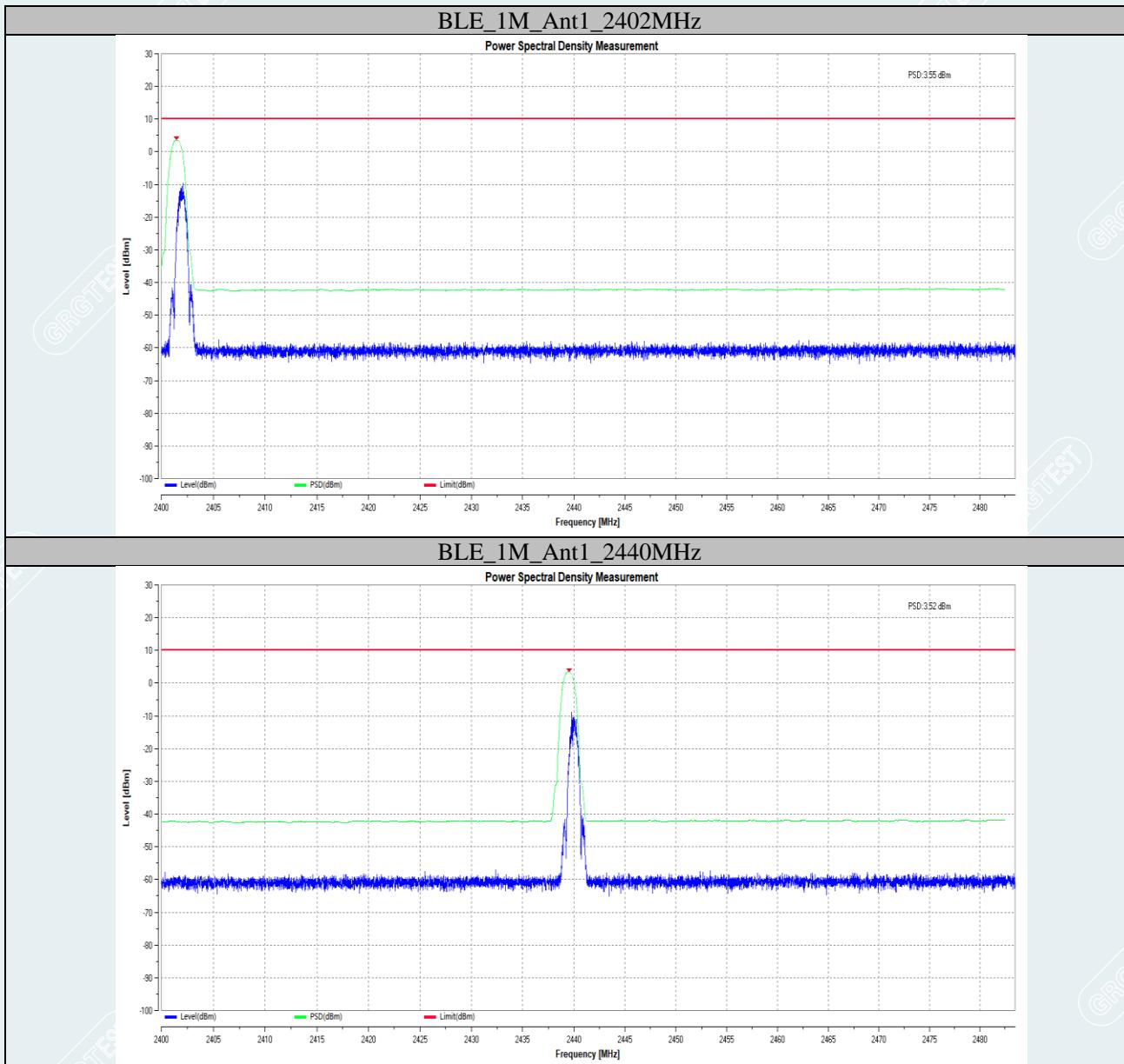
Test Engineer: Huang Tianmei

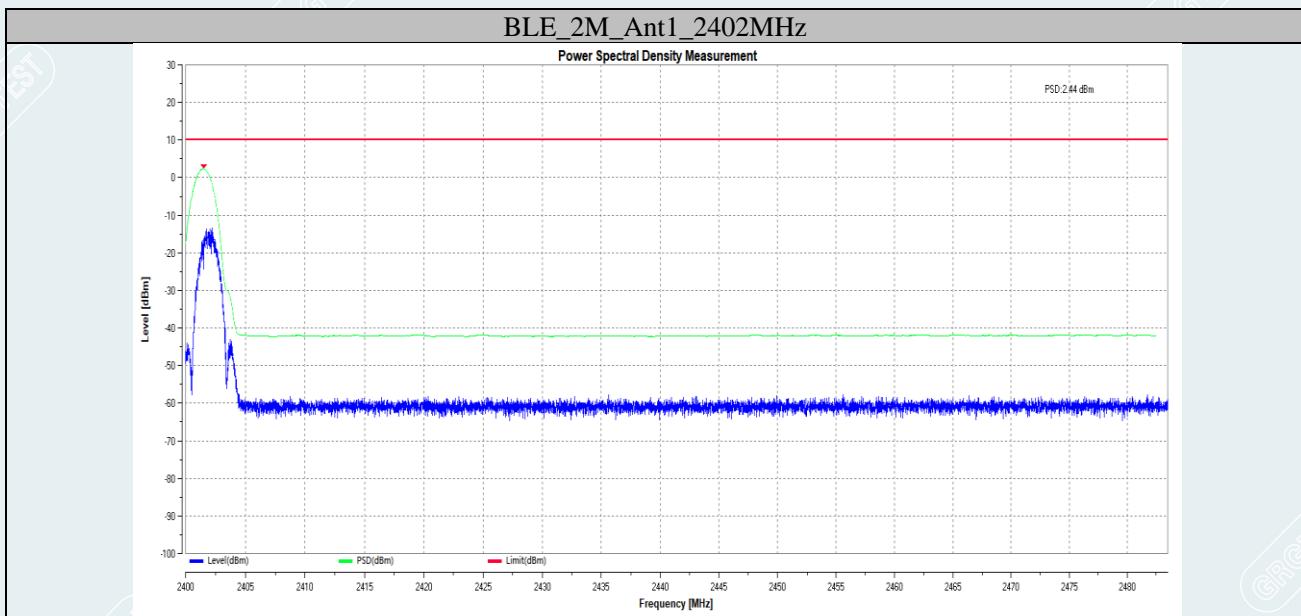
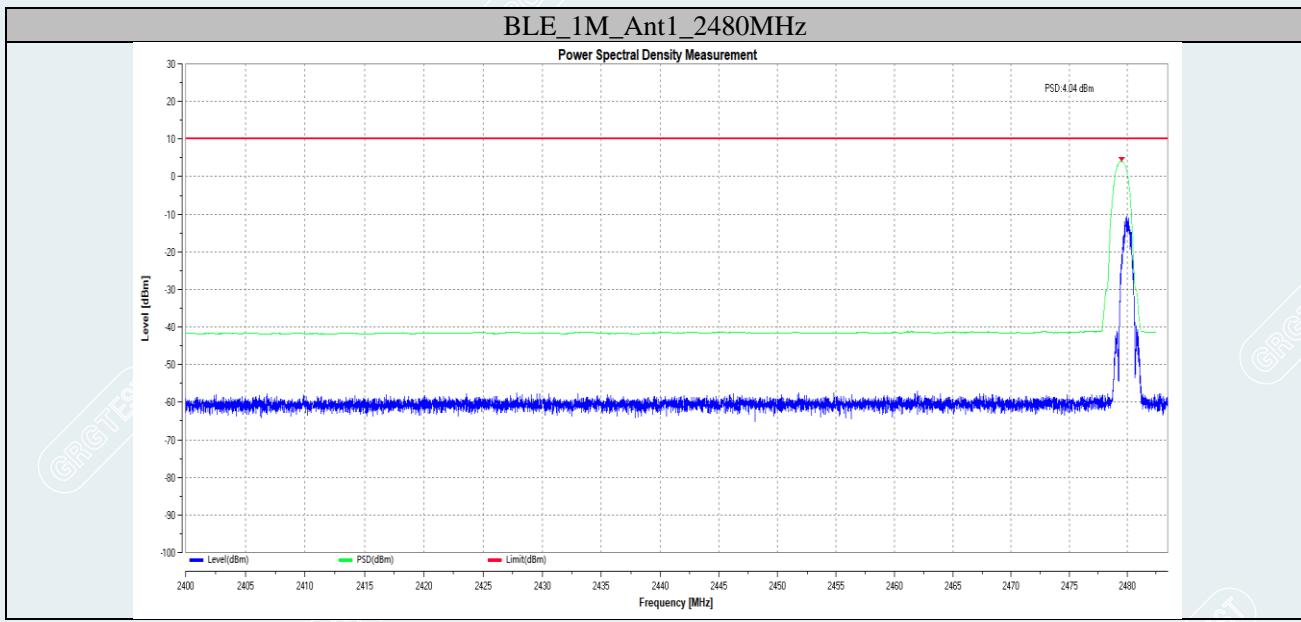
Test Date: 2023-11-16

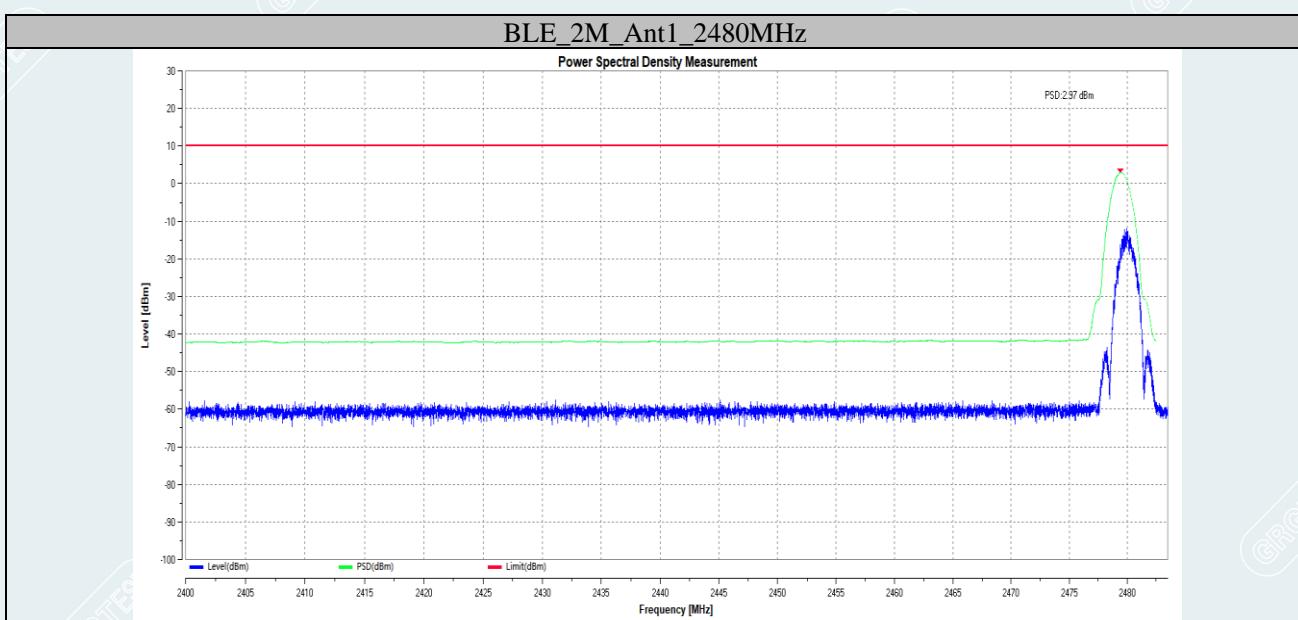
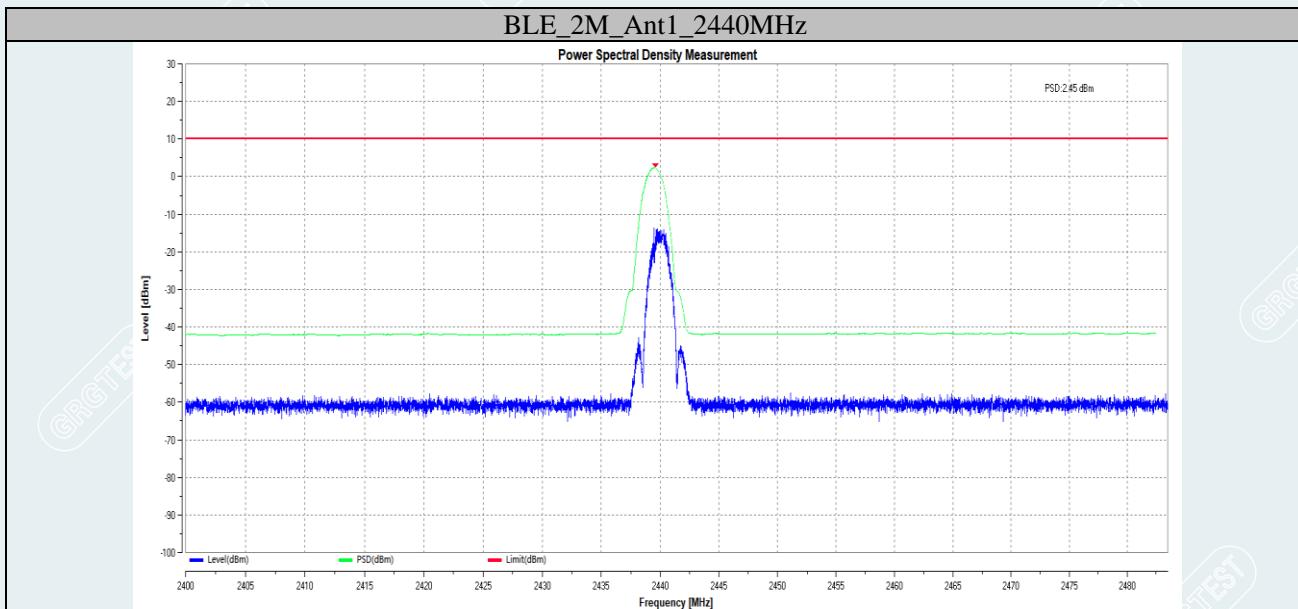
Test Voltage: DC 5V

Test mode	Antenna	Frequency [MHz]	PSD[dBm/MHz]	Limit[dBm/MHz]	Verdict
BLE_1M	Ant1	2402	3.55	10	PASS
		2440	3.52	10	PASS
		2480	4.04	10	PASS
BLE_2M	Ant1	2402	2.44	10	PASS
		2440	2.45	10	PASS
		2480	2.97	10	PASS

Test screenshots







6.3 OCCUPIED CHANNEL BANDWIDTH

Test Requirement: ETSI EN300 328 V2.2.2/ 4.3.2.7

Test Method: ETSI EN300 328 V2.2.2/5.4.7.2.1

6.3.1 LIMIT

This requirement applies to all types of non-FHSS equipment.

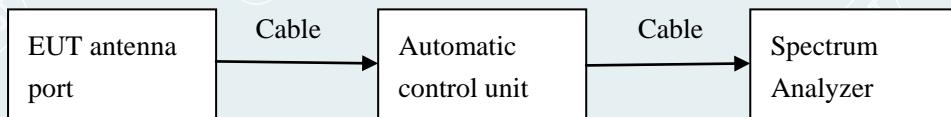
The Occupied Channel Bandwidth shall fall completely within the band given in table 2.

In addition, for non-adaptive equipment using wide band modulations other than FHSS and with e.i.r.p. greater than 10 dBm, the occupied channel bandwidth shall be less than 20 MHz.

Table 2: Service frequency bands

	Service frequency bands
Transmit	2 400 MHz to 2 483,5 MHz
Receive	2 400 MHz to 2 483,5 MHz

6.3.2 TEST CONFIGURATION



6.3.3 TEST PROCEDURES

Test condition: Normal test conditions.

Test frequency: 2402MHz, 2440MHz and 2480MHz for BLE

Test procedure: Test procedure is according to Clause 5.4.7.2.1 of ETSI EN 300 328 V2.2.2

----- The following blanks -----

6.3.4 TEST RESULTS

Test environment: Normal condition:
24.1°C/39%RH/101.0kPa

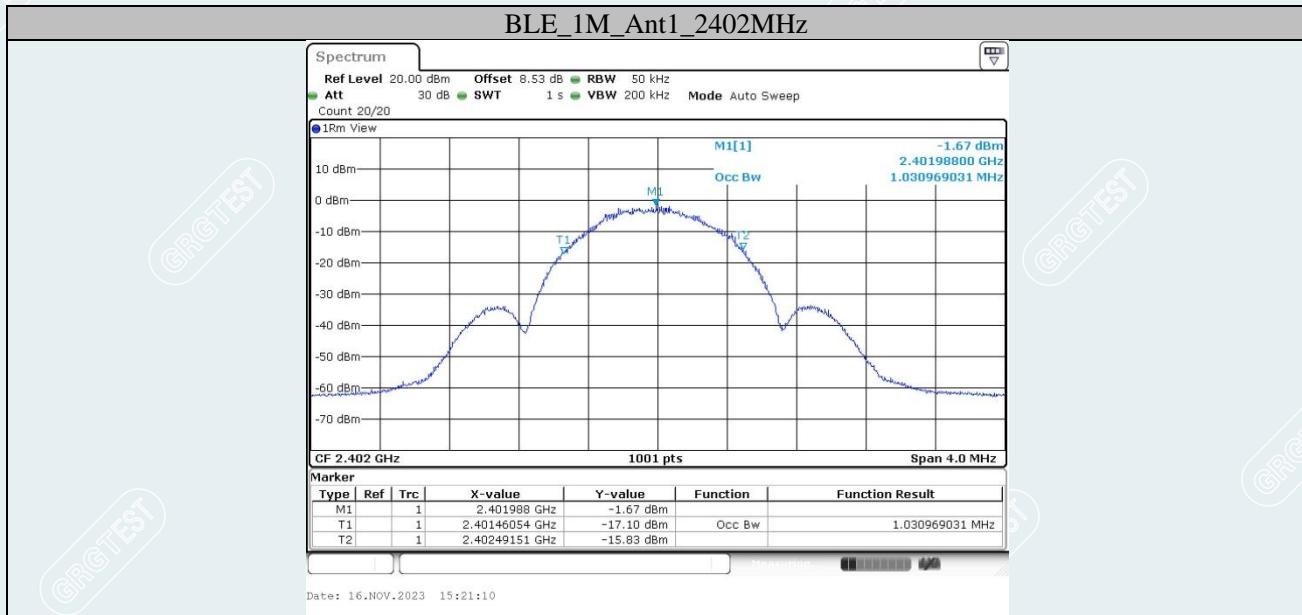
Test Engineer: Huang Tianmei

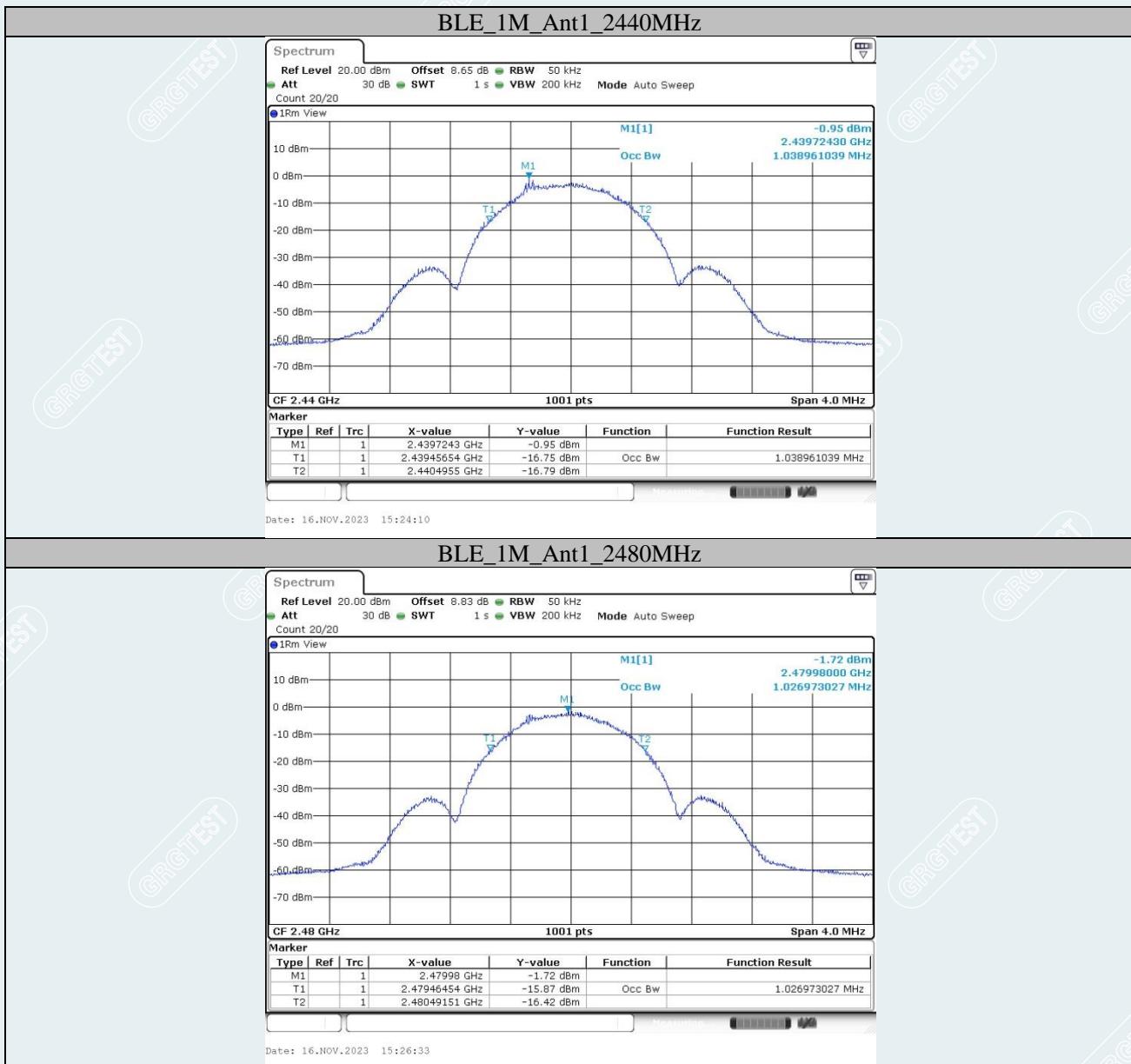
Test Date: 2023-11-16

Test Voltage: DC 5V

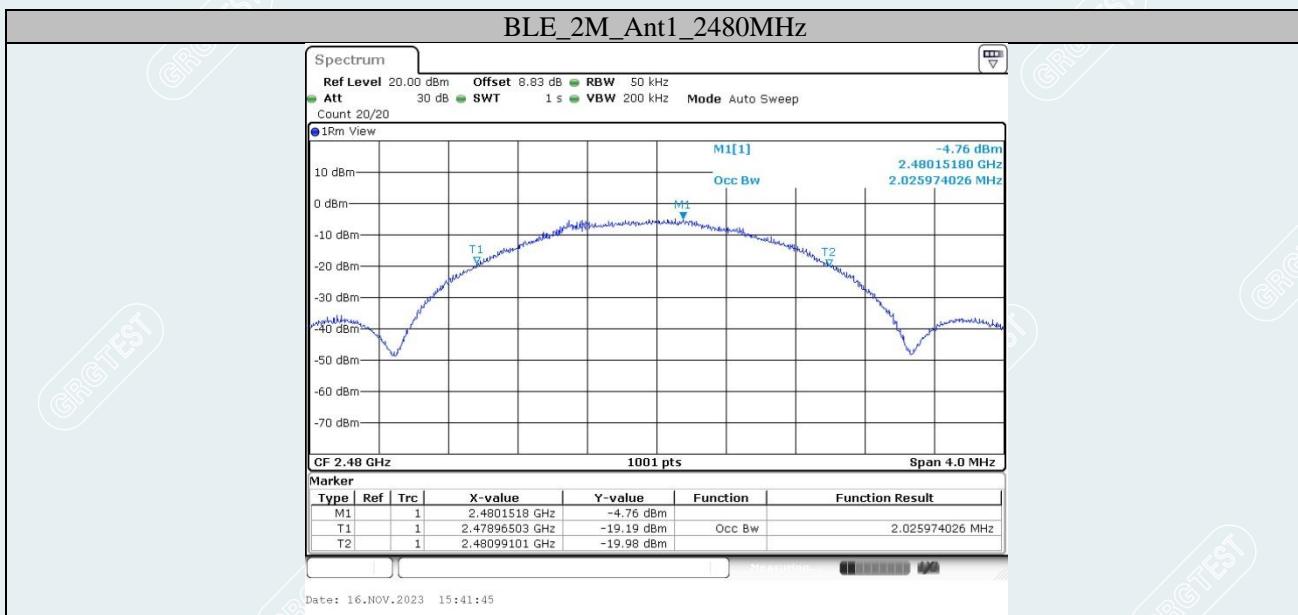
Test Mode	Antenna	Freq[MHz]	OCB[MHz]	F _L [MHz]	F _H [MHz]	Limit[MHz]	Verdict
BLE_1M	Ant1	2402	1.031	2401.4605	2402.4915	2400 to 2483.5	PASS
		2440	1.039	2439.4565	2440.4955	2400 to 2483.5	PASS
		2480	1.027	2479.4645	2480.4915	2400 to 2483.5	PASS
BLE_2M	Ant1	2402	2.054	2400.9491	2403.0030	2400 to 2483.5	PASS
		2440	2.042	2438.9570	2440.9990	2400 to 2483.5	PASS
		2480	2.026	2478.9650	2480.9910	2400 to 2483.5	PASS

Test screenshots









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6.4 TRANSMITTER UNWANTED EMISSIONS IN THE OUT-OF-BAND DOMAIN

Test Requirement: ETSI EN300 328 V2.2.2/ 4.3.2.8

Test Method: ETSI EN300 328 V2.2.2/5.4.8.2.1

6.4.1 LIMIT

This requirement applies to all types of FHSS equipment and all types of non-FHSS equipment.

The transmitter unwanted emissions in the out-of-band domain but outside the allocated band, shall not exceed the values provided by the mask in figure 3.

Within the band specified in table 3, the Out-of-band emissions are fulfilled by compliance with the Occupied Channel Bandwidth requirement in clause 6.10.1.1 and 6.10.1.2.

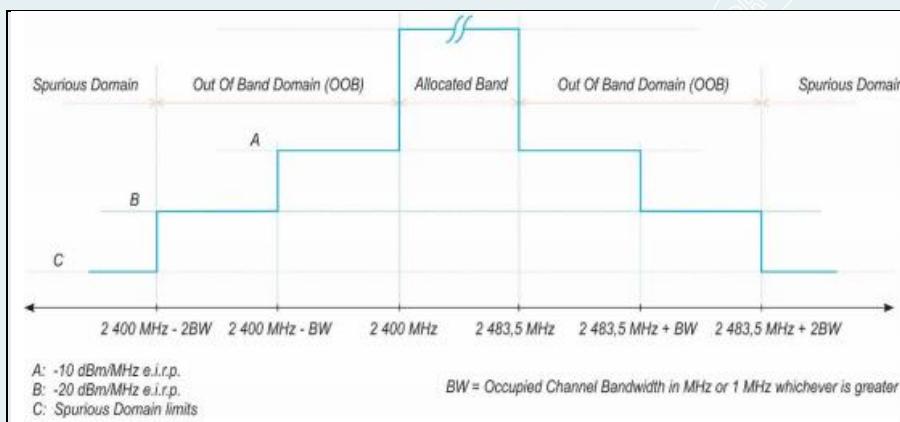
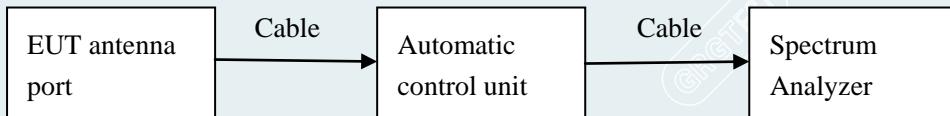


Figure 3: Transmit mask

6.4.2 TEST CONFIGURATION



6.4.3 TEST PROCEDURES

Test condition: Normal test conditions.

Test frequency: 2402MHz,2480MHz for BLE

Test procedure: Test procedure is according to Clause 5.4.8.2.1 of ETSI EN 300 328 V2.2.2

6.4.4 TEST RESULTS

Test environment: Normal condition:
24.1°C/39%RH/101.0kPa

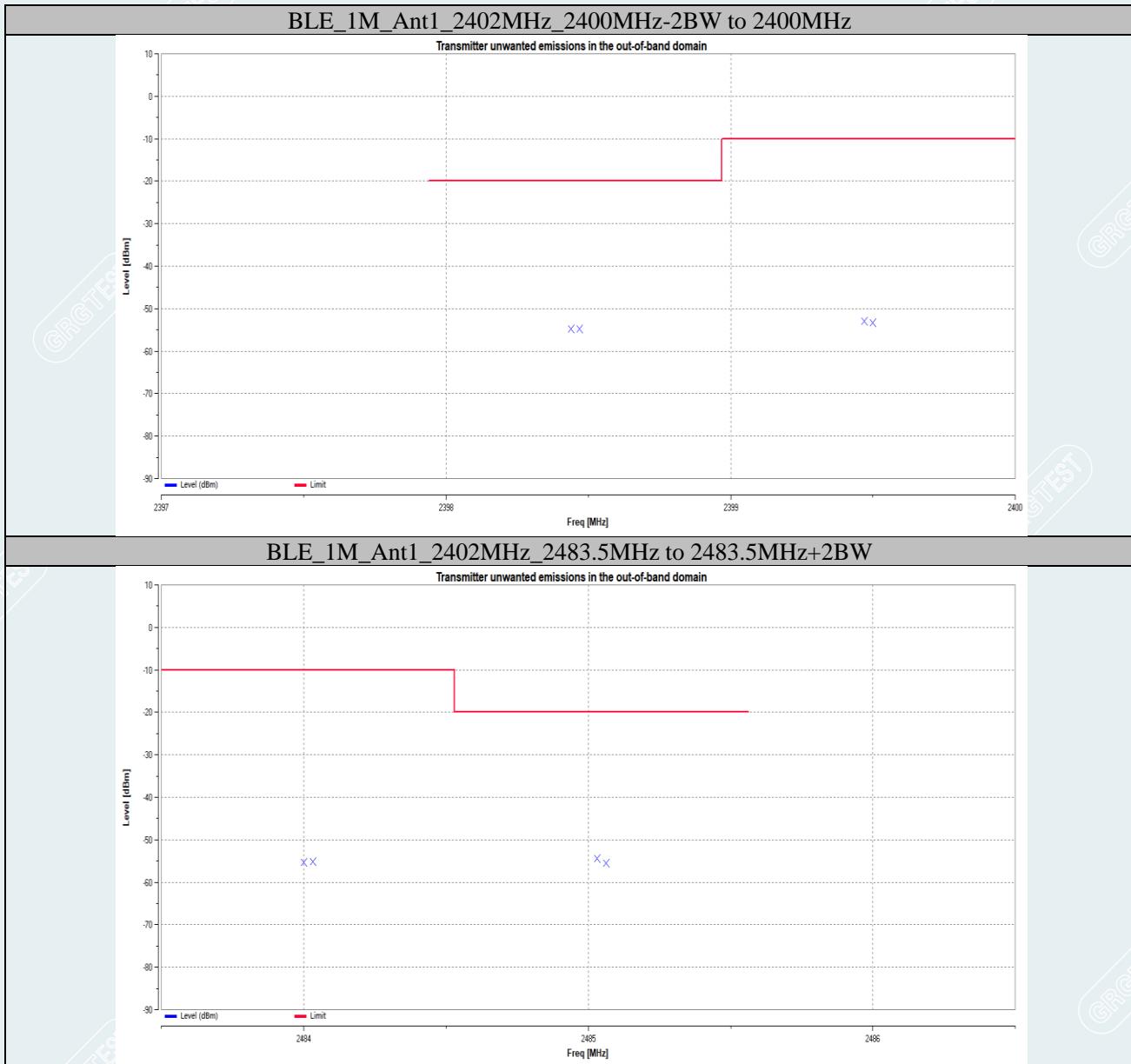
Test Engineer: Huang Tianmei

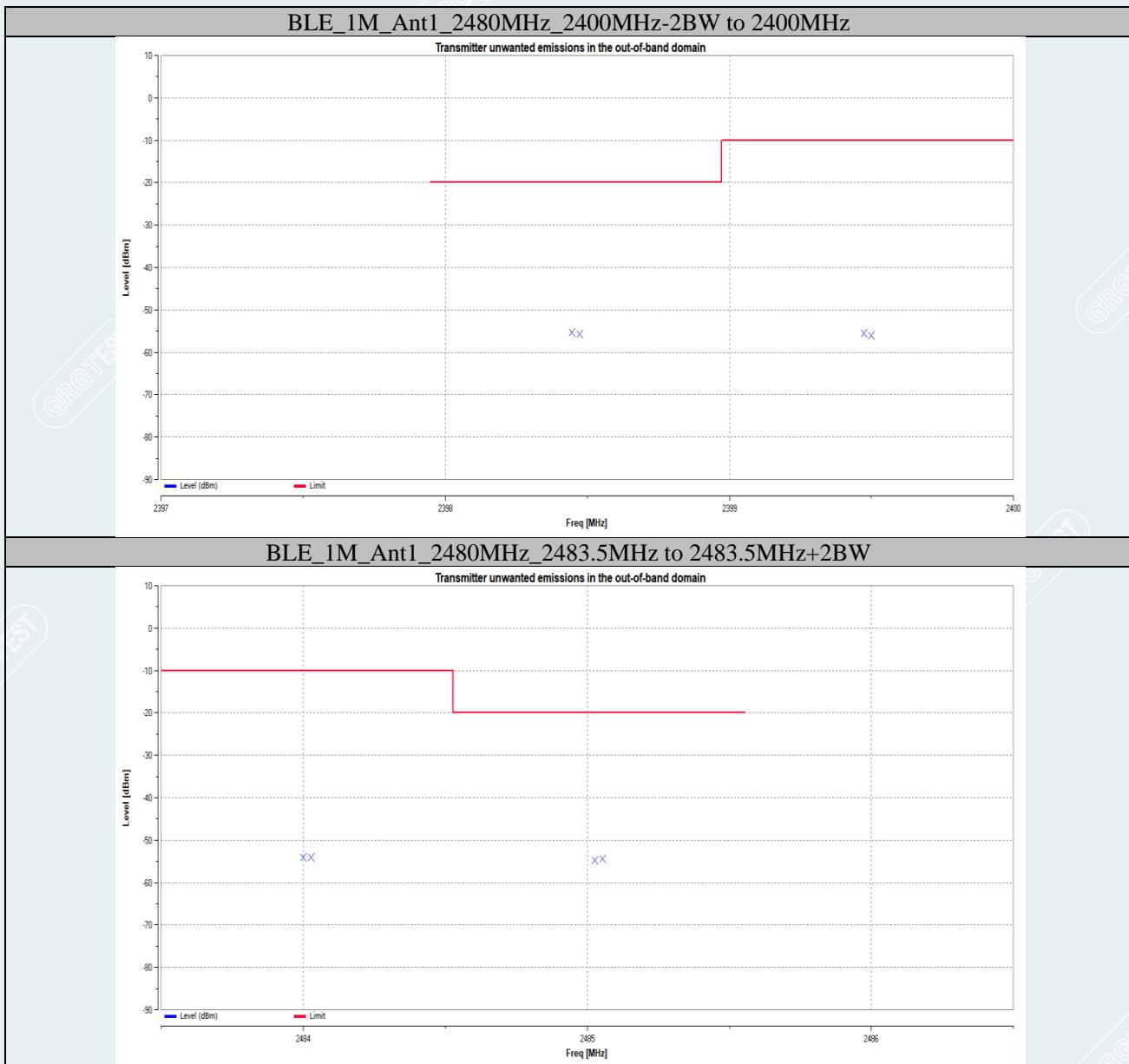
Test Date: 2023-11-16

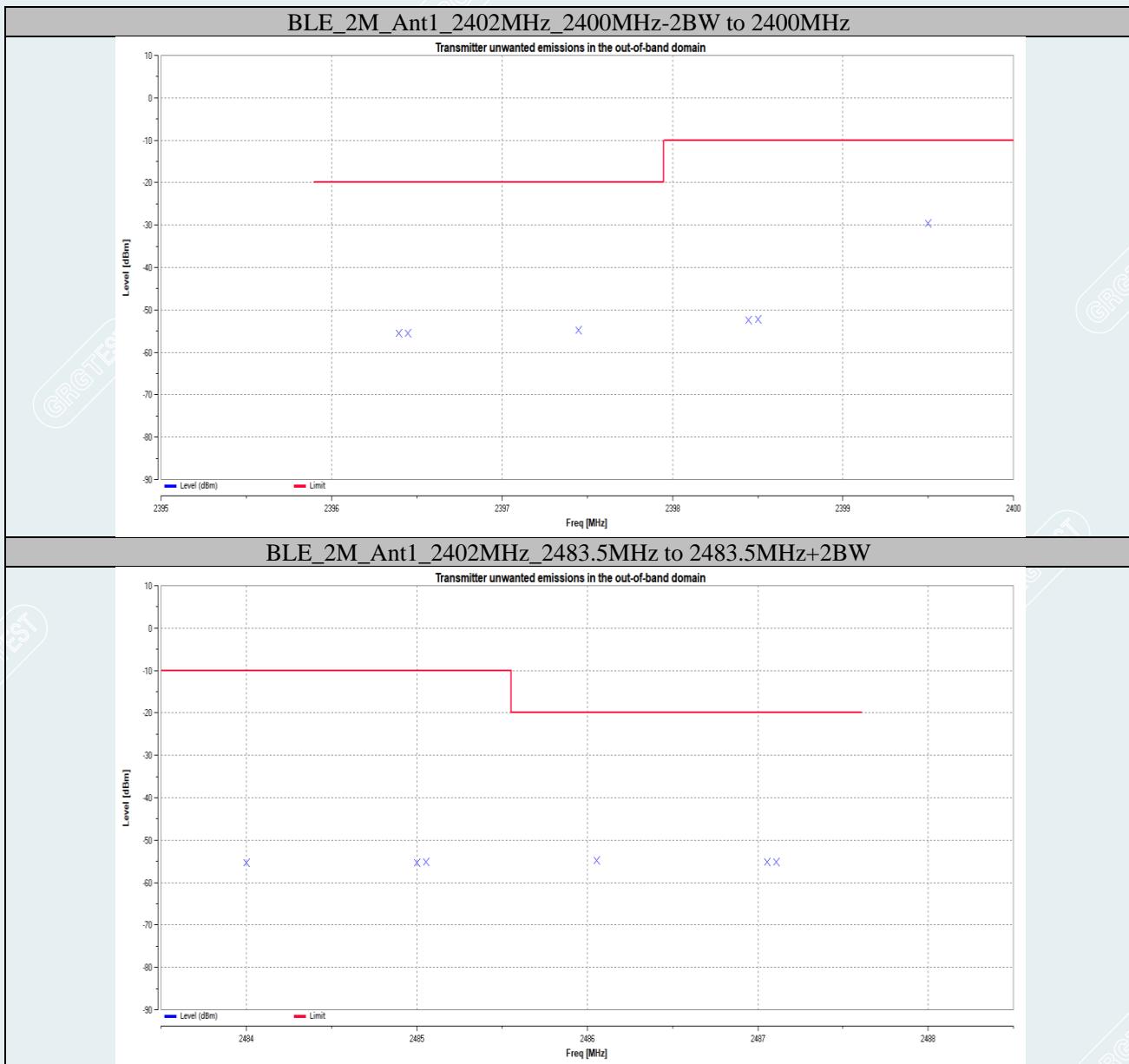
Test Voltage: DC 5V

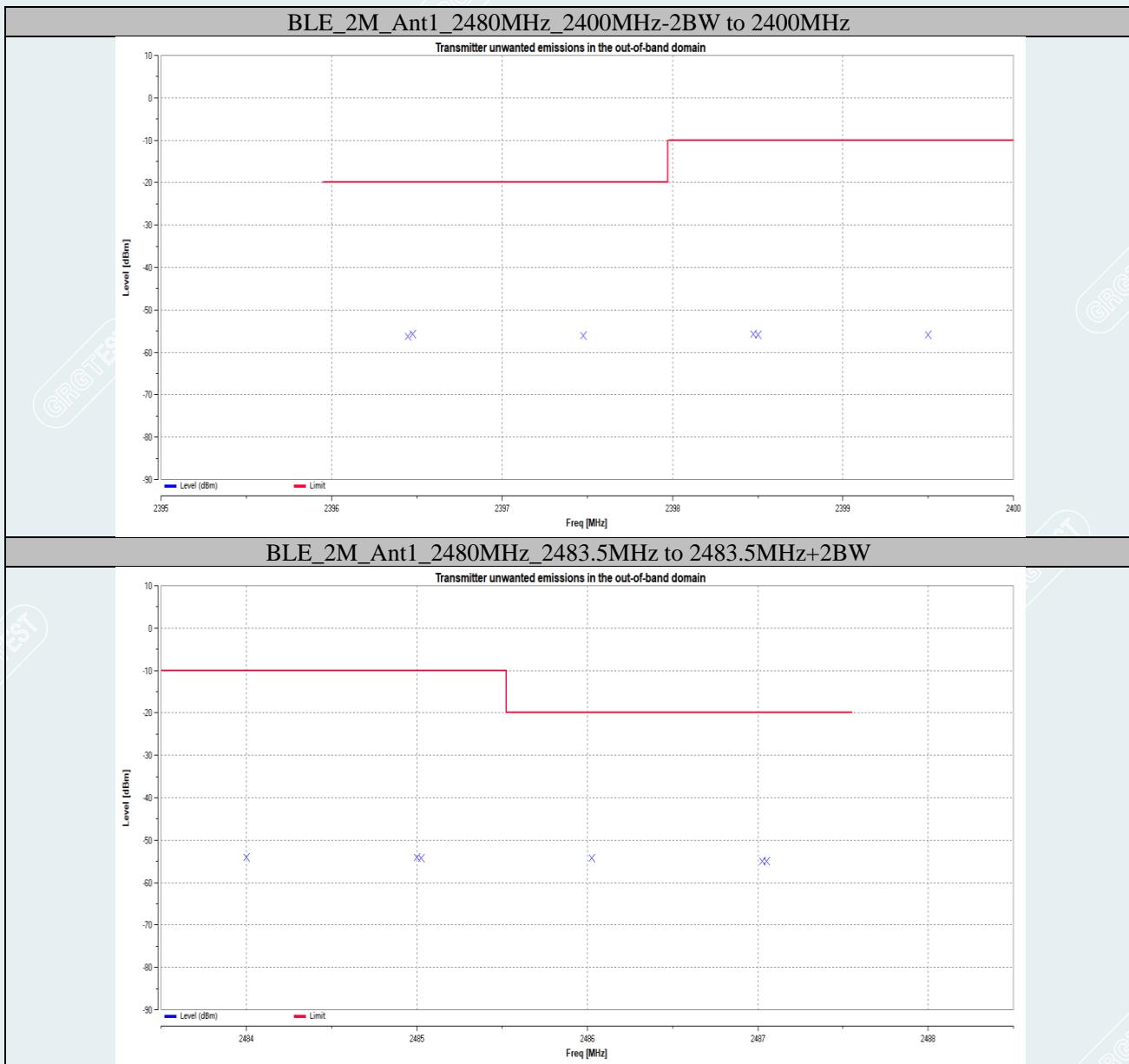
Test mode	Antenna	Frequency [MHz]	Frequency[MHz]	Level[dBm]	Limit[dBm]	Verdict
BLE_1M	Ant1	2402	2398.438	-54.72	-20.00	PASS
			2398.469	-54.74	-20.00	PASS
			2399.469	-52.99	-10.00	PASS
			2399.5	-53.40	-10.00	PASS
			2484	-55.27	-10.00	PASS
			2484.031	-55.21	-10.00	PASS
			2485.031	-54.50	-20.00	PASS
			2485.062	-55.44	-20.00	PASS
		2480	2398.446	-55.41	-20.00	PASS
			2398.473	-55.77	-20.00	PASS
			2399.473	-55.55	-10.00	PASS
			2399.5	-56.02	-10.00	PASS
			2484	-54.03	-10.00	PASS
			2484.027	-54.09	-10.00	PASS
			2485.027	-54.77	-20.00	PASS
			2485.054	-54.40	-20.00	PASS
BLE_2M	Ant1	2402	2396.392	-55.44	-20.00	PASS
			2396.446	-55.43	-20.00	PASS
			2397.446	-54.74	-20.00	PASS
			2398.446	-52.34	-10.00	PASS
			2398.5	-52.31	-10.00	PASS
			2399.5	-29.51	-10.00	PASS
			2484	-55.33	-10.00	PASS
			2485	-55.34	-10.00	PASS
		2480	2485.054	-55.15	-10.00	PASS
			2486.054	-54.71	-20.00	PASS
			2487.054	-55.14	-20.00	PASS
			2487.108	-55.18	-20.00	PASS
			2396.448	-56.28	-20.00	PASS
			2396.474	-55.74	-20.00	PASS
			2397.474	-56.06	-20.00	PASS
			2398.474	-55.72	-10.00	PASS

Test screenshots









6.5 TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

Test Requirement: ETSI EN300 328 V2.2.2/ 4.3.2.9

Test Method: ETSI EN300 328 V2.2.2/5.4.9.2.2

6.5.1 LIMIT

This requirement applies to all types of non-FHSS equipment.

The transmitter unwanted emissions in the spurious domain shall not exceed the values given in table 2. In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p. for emissions up to 1 GHz and as e.i.r.p. for emissions above 1 GHz.

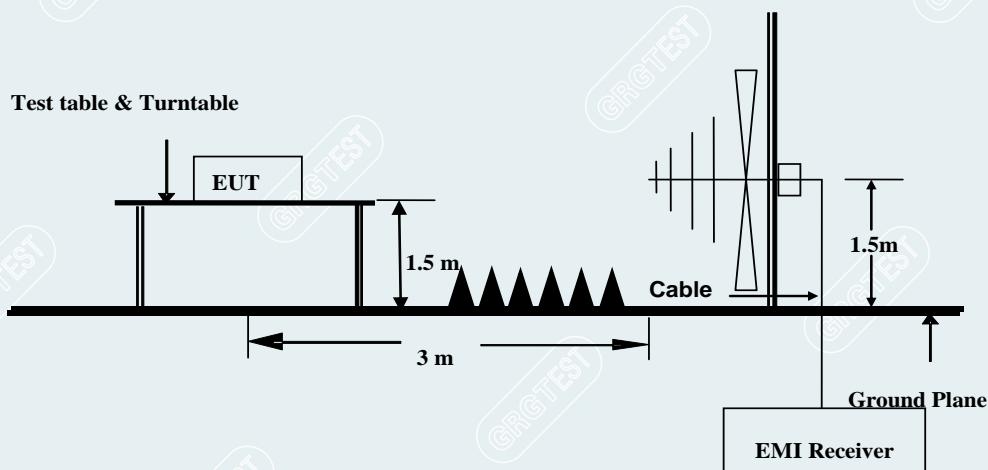
Table 2: Transmitter limits for spurious emissions

Frequency range	Maximum power	Bandwidth
30 MHz to 47 MHz	-36 dBm	100 kHz
47 MHz to 74 MHz	-54 dBm	100 kHz
74 MHz to 87,5 MHz	-36 dBm	100 kHz
87,5 MHz to 118 MHz	-54 dBm	100 kHz
118 MHz to 174 MHz	-36 dBm	100 kHz
174 MHz to 230 MHz	-54 dBm	100 kHz
230 MHz to 470 MHz	-36 dBm	100 kHz
470 MHz to 694 MHz	-54 dBm	100 kHz
694 MHz to 1 GHz	-36 dBm	100 kHz
1 GHz to 12,75 GHz	-30 dBm	1 MHz

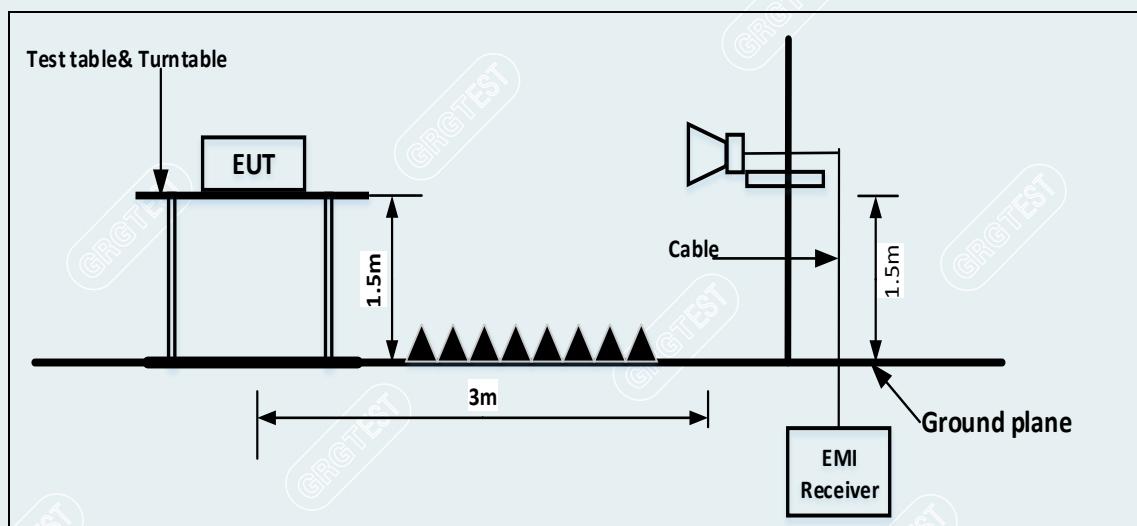
----- The following blanks -----

6.5.2 TEST CONFIGURATION

30MHz-1000MHz



1000MHz~12750MHz



6.5.3 TEST PROCEDURES

Test condition: Normal test conditions.

Test channel: Lowest channel, Highest channel

Test procedure: Test procedure is according to Clause 5.4.9.2.1 of ETSI EN 300 328 V2.2.2

Remark: /

6.5.4 DATA SAMPLE

Frequency [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
XXX	-49.71	-57.90	-30.00	27.90	-8.19	RMS	Horizontal

Frequency (MHz) = Emission frequency in MHz

Reading (dBm) = Uncorrected Analyzer / Receiver reading

Level (dBm) = Reading (dBm) + Factor (dB)

Limit (dBm) = Limit stated in standard

Margin (dB) = Limit (dBm) – Level (dBm)

RMS = Root Mean Square

----- The following blanks -----

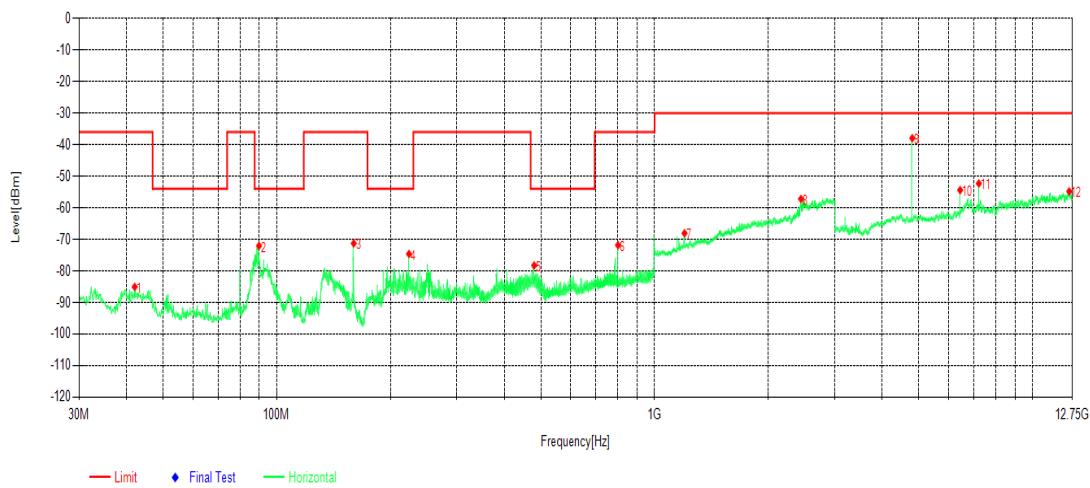
6.5.5 TEST RESULTS

Pre-scan all modes, the worst power supply is AC 230/50Hz (DC 5V/2A power by Adapter), in the two power supply modes, 1GHz-12.75GHz data only record the worst power supply mode (DC 5V/2A power by Adapter) and 30MHz-1GHz records the data of two power supply modes (DC 5V/2A power by Adapter & DC 48V/0.27A power by PoE Adapter) in this report.

Power supply: AC 230V/50Hz(DC 5V/2A power by Adapter)

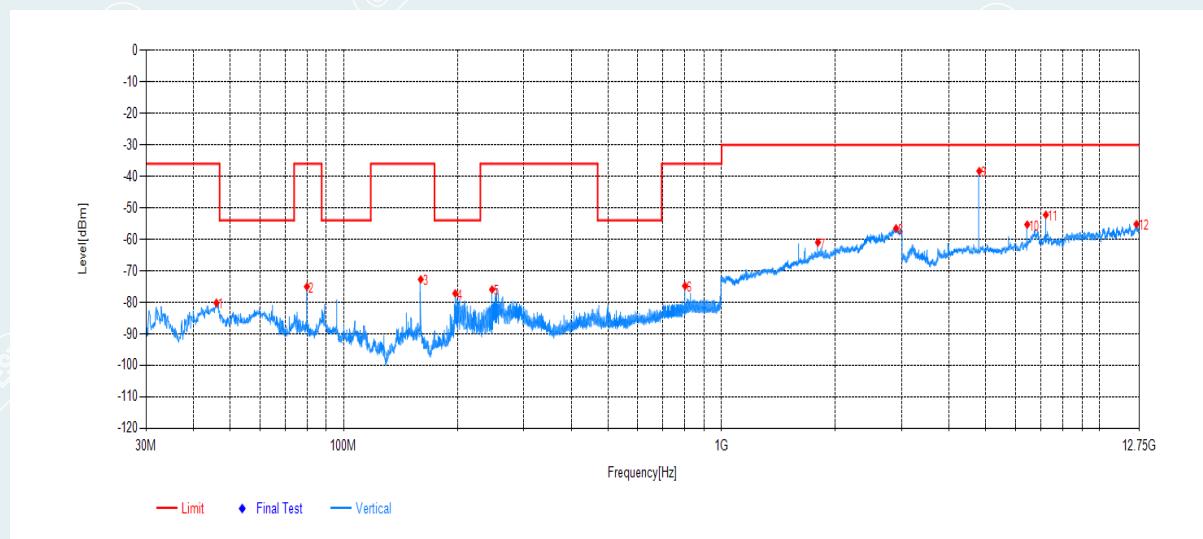
30MHz-12.75GHz

Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_1M_2402MHz	Voltage:	AC 230V/50Hz
Environment:	24.4°C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	42.125	-70.59	-85.09	-36.00	49.09	-14.50	RMS	Horizontal
2	89.849	-55.08	-72.09	-54.00	18.09	-17.01	RMS	Horizontal
3	159.98	-51.41	-71.29	-36.00	35.29	-19.88	RMS	Horizontal
4	224	-57.52	-74.68	-54.00	20.68	-17.16	RMS	Horizontal
5	479.983	-66.98	-78.31	-54.00	24.31	-11.33	RMS	Horizontal
6	799.986	-66.40	-71.87	-36.00	35.87	-5.47	RMS	Horizontal
7	1200	-67.85	-68.07	-30.00	38.07	-0.22	RMS	Horizontal
8	2438.2	-68.11	-57.23	-30.00	27.23	10.88	RMS	Horizontal
9	4803.75	-35.95	-37.94	-30.00	7.94	-1.99	RMS	Horizontal
10	6432	-56.57	-54.41	-30.00	24.41	2.16	RMS	Horizontal
11	7205.175	-57.29	-52.31	-30.00	22.31	4.98	RMS	Horizontal
12	12492.6	-69.32	-54.81	-30.00	24.81	14.51	RMS	Horizontal

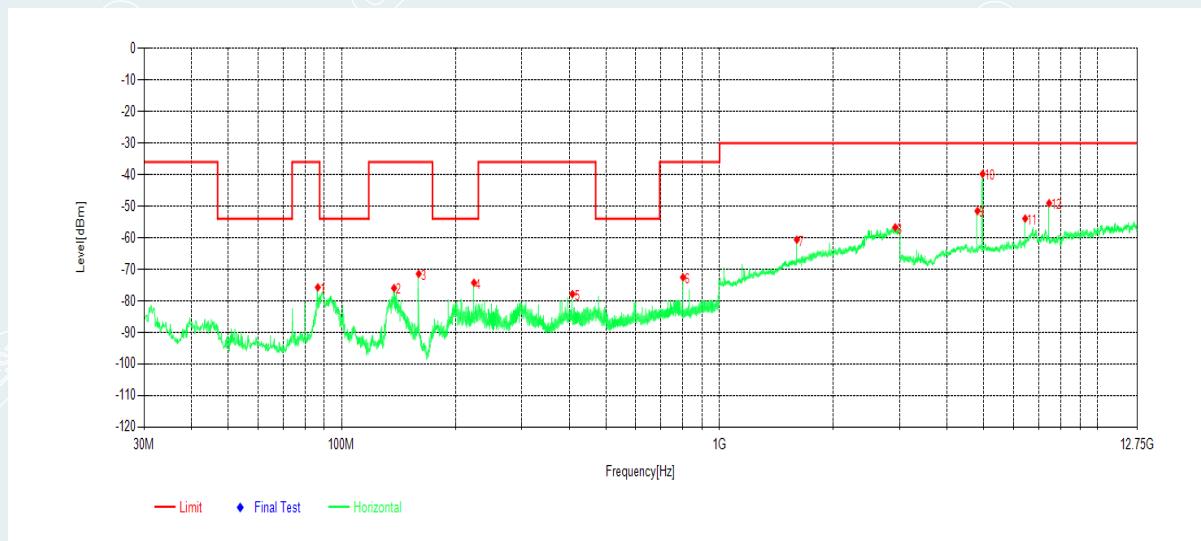
Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_1M_2402MHz	Voltage:	AC 230V/50Hz
Environment:	24.4 °C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	46.102	-66.53	-80.18	-36.00	44.18	-13.65	RMS	Vertical
2	79.955	-53.37	-75.05	-36.00	39.05	-21.68	RMS	Vertical
3	159.98	-55.08	-72.73	-36.00	36.73	-17.65	RMS	Vertical
4	197.422	-59.65	-77.18	-54.00	23.18	-17.53	RMS	Vertical
5	246.989	-59.93	-75.94	-36.00	39.94	-16.01	RMS	Vertical
6	799.986	-69.39	-74.80	-36.00	38.80	-5.41	RMS	Vertical
7	1797.6	-67.57	-60.99	-30.00	30.99	6.58	RMS	Vertical
8	2892.4	-70.09	-56.51	-30.00	26.51	13.58	RMS	Vertical
9	4803.75	-36.56	-38.34	-30.00	8.34	-1.78	RMS	Vertical
10	6432	-57.50	-55.33	-30.00	25.33	2.17	RMS	Vertical
11	7206.15	-57.15	-52.22	-30.00	22.22	4.93	RMS	Vertical
12	12508.2	-69.88	-55.16	-30.00	25.16	14.72	RMS	Vertical

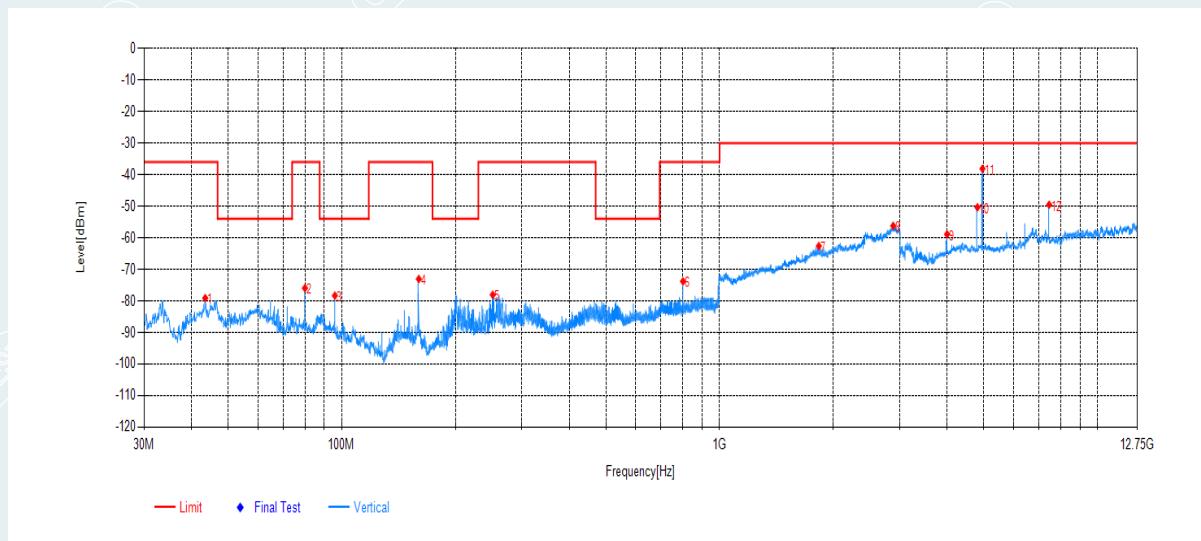
Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_1M_2480MHz	Voltage:	AC 230V/50Hz
Environment:	24.4 °C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	86.551	-56.58	-75.74	-36.00	39.74	-19.16	RMS	Horizontal
2	137.67	-57.35	-75.97	-36.00	39.97	-18.62	RMS	Horizontal
3	159.98	-51.59	-71.47	-36.00	35.47	-19.88	RMS	Horizontal
4	224	-57.10	-74.26	-54.00	20.26	-17.16	RMS	Horizontal
5	408.009	-65.99	-77.86	-36.00	41.86	-11.87	RMS	Horizontal
6	799.986	-67.11	-72.58	-36.00	36.58	-5.47	RMS	Horizontal
7	1600	-65.01	-60.62	-30.00	30.62	4.39	RMS	Horizontal
8	2914.8	-69.94	-56.70	-30.00	26.70	13.24	RMS	Horizontal
9	4806.675	-49.56	-51.52	-30.00	21.52	-1.96	RMS	Horizontal
10	4959.75	-38.75	-39.78	-30.00	9.78	-1.03	RMS	Horizontal
11	6432	-56.08	-53.92	-30.00	23.92	2.16	RMS	Horizontal
12	7439.175	-53.90	-49.05	-30.00	19.05	4.85	RMS	Horizontal

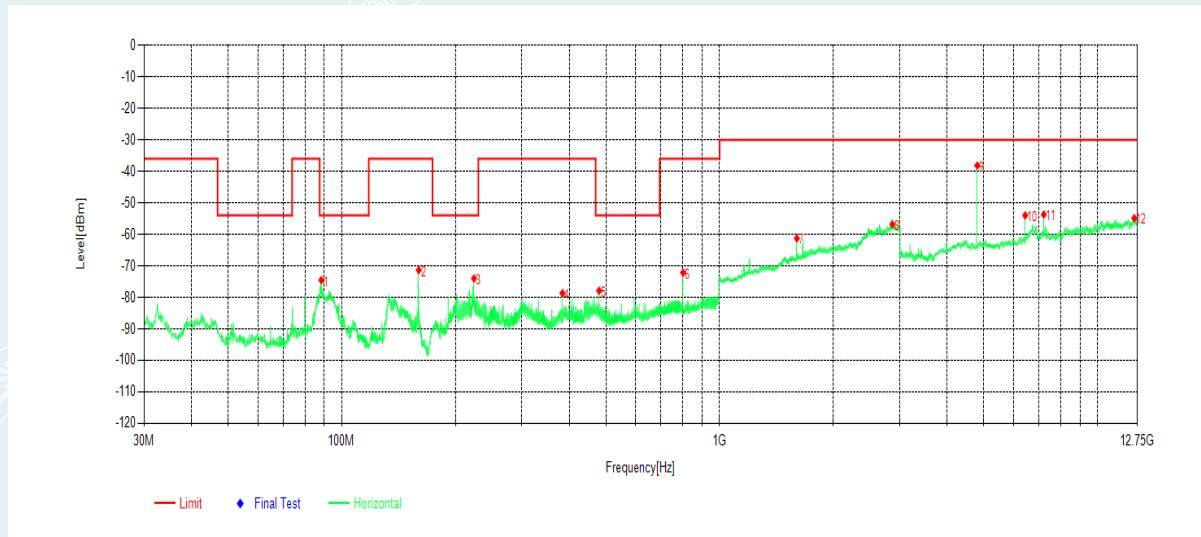
Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_1M_2480MHz	Voltage:	AC 230V/50Hz
Environment:	24.4 °C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

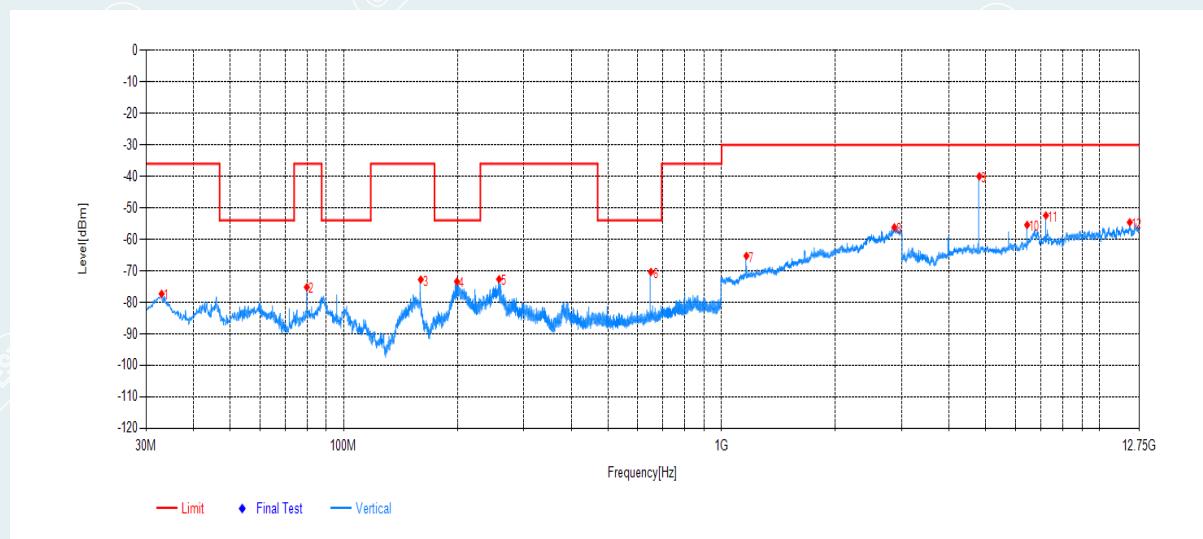
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	43.58	-65.35	-79.15	-36.00	43.15	-13.80	RMS	Vertical
2	79.955	-54.27	-75.95	-36.00	39.95	-21.68	RMS	Vertical
3	95.96	-59.05	-78.36	-36.00	24.36	-19.31	RMS	Vertical
4	159.98	-55.42	-73.07	-36.00	37.07	-17.65	RMS	Vertical
5	250.966	-61.81	-78.08	-36.00	42.08	-16.27	RMS	Vertical
6	799.986	-68.41	-73.82	-36.00	37.82	-5.41	RMS	Vertical
7	1829.6	-69.62	-62.65	-30.00	32.65	6.97	RMS	Vertical
8	2877.4	-69.77	-56.23	-30.00	26.23	13.54	RMS	Vertical
9	3994.5	-55.45	-58.90	-30.00	28.90	-3.45	RMS	Vertical
10	4806.675	-48.62	-50.36	-30.00	20.36	-1.74	RMS	Vertical
11	4959.75	-37.21	-38.11	-30.00	8.11	-0.90	RMS	Vertical
12	7440.15	-54.46	-49.54	-30.00	19.54	4.92	RMS	Vertical

Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_2M_2402MHz	Voltage:	AC 230V/50Hz
Environment:	24.4°C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List								
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	88.394	-56.61	-74.57	-54.00	20.57	-17.96	RMS	Horizontal
2	159.98	-51.49	-71.37	-36.00	35.37	-19.88	RMS	Horizontal
3	224	-56.89	-74.05	-54.00	20.05	-17.16	RMS	Horizontal
4	383.953	-66.80	-78.73	-36.00	42.73	-11.93	RMS	Horizontal
5	479.983	-66.64	-77.97	-54.00	23.97	-11.33	RMS	Horizontal
6	799.986	-66.71	-72.18	-36.00	36.18	-5.47	RMS	Horizontal
7	1600	-65.70	-61.31	-30.00	31.31	4.39	RMS	Horizontal
8	2863.4	-70.00	-56.82	-30.00	26.82	13.18	RMS	Horizontal
9	4802.775	-36.16	-38.17	-30.00	8.17	-2.01	RMS	Horizontal
10	6432	-56.14	-53.98	-30.00	23.98	2.16	RMS	Horizontal
11	7204.2	-58.70	-53.71	-30.00	23.71	4.99	RMS	Horizontal
12	12498.45	-69.48	-54.85	-30.00	24.85	14.63	RMS	Horizontal

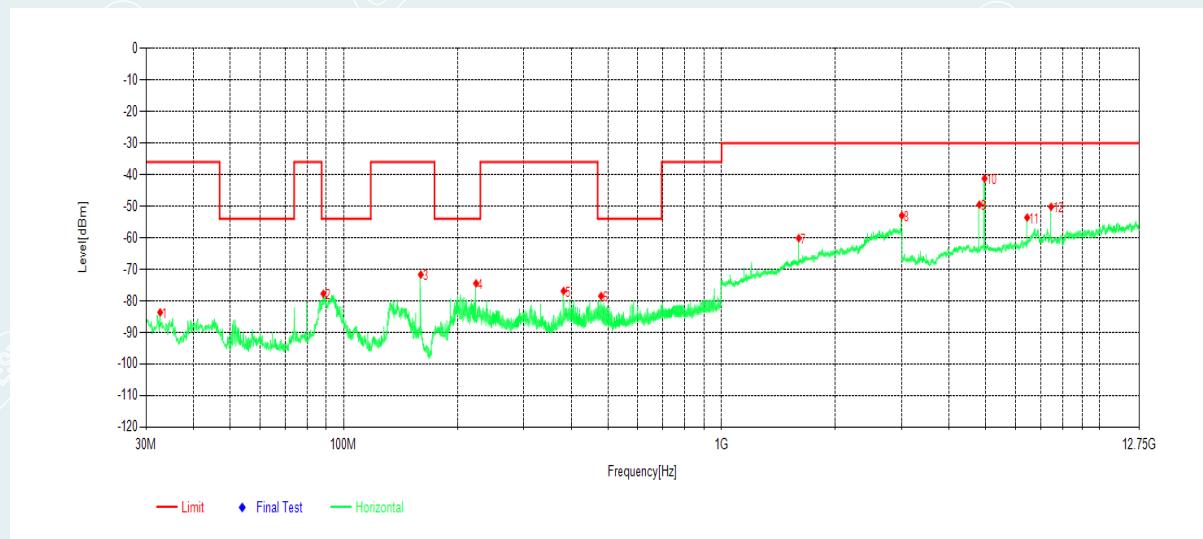
Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_2M_2402MHz	Voltage:	AC 230V/50Hz
Environment:	24.4 °C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	33.007	-60.76	-77.33	-36.00	41.33	-16.57	RMS	Vertical
2	79.955	-53.54	-75.22	-36.00	39.22	-21.68	RMS	Vertical
3	159.98	-55.15	-72.80	-36.00	36.80	-17.65	RMS	Vertical
4	199.459	-55.89	-73.42	-54.00	19.42	-17.53	RMS	Vertical
5	257.756	-56.33	-72.69	-36.00	36.69	-16.36	RMS	Vertical
6	650.024	-63.14	-70.39	-54.00	16.39	-7.25	RMS	Vertical
7	1162.6	-64.55	-65.28	-30.00	35.28	-0.73	RMS	Vertical
8	2863.4	-69.76	-56.19	-30.00	26.19	13.57	RMS	Vertical
9	4802.775	-38.21	-40.01	-30.00	10.01	-1.80	RMS	Vertical
10	6432	-57.60	-55.43	-30.00	25.43	2.17	RMS	Vertical
11	7207.125	-57.37	-52.45	-30.00	22.45	4.92	RMS	Vertical
12	12008.02	-67.70	-54.58	-30.00	24.58	13.12	RMS	Vertical

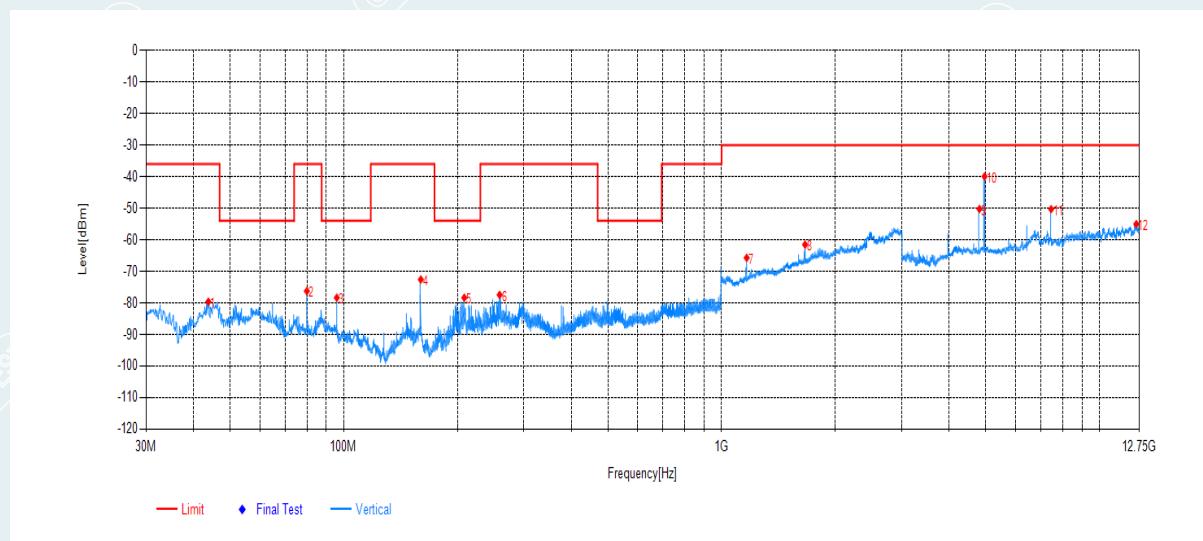
Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_2M_2480MHz	Voltage:	AC 230V/50Hz
Environment:	24.4 °C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	32.716	-68.97	-83.66	-36.00	47.66	-14.69	RMS	Horizontal
2	88.394	-59.79	-77.75	-54.00	23.75	-17.96	RMS	Horizontal
3	159.98	-51.80	-71.68	-36.00	35.68	-19.88	RMS	Horizontal
4	224	-57.32	-74.48	-54.00	20.48	-17.16	RMS	Horizontal
5	381.916	-64.80	-76.92	-36.00	40.92	-12.12	RMS	Horizontal
6	479.983	-67.14	-78.47	-54.00	24.47	-11.33	RMS	Horizontal
7	1600.2	-64.54	-60.15	-30.00	30.15	4.39	RMS	Horizontal
8	2997.8	-66.11	-52.95	-30.00	22.95	13.16	RMS	Horizontal
9	4806.675	-47.53	-49.49	-30.00	19.49	-1.96	RMS	Horizontal
10	4960.725	-40.17	-41.21	-30.00	11.21	-1.04	RMS	Horizontal
11	6432	-55.76	-53.60	-30.00	23.60	2.16	RMS	Horizontal
12	7441.125	-55.01	-50.18	-30.00	20.18	4.83	RMS	Horizontal

Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_2M_2480MHz	Voltage:	AC 230V/50Hz
Environment:	24.4 °C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

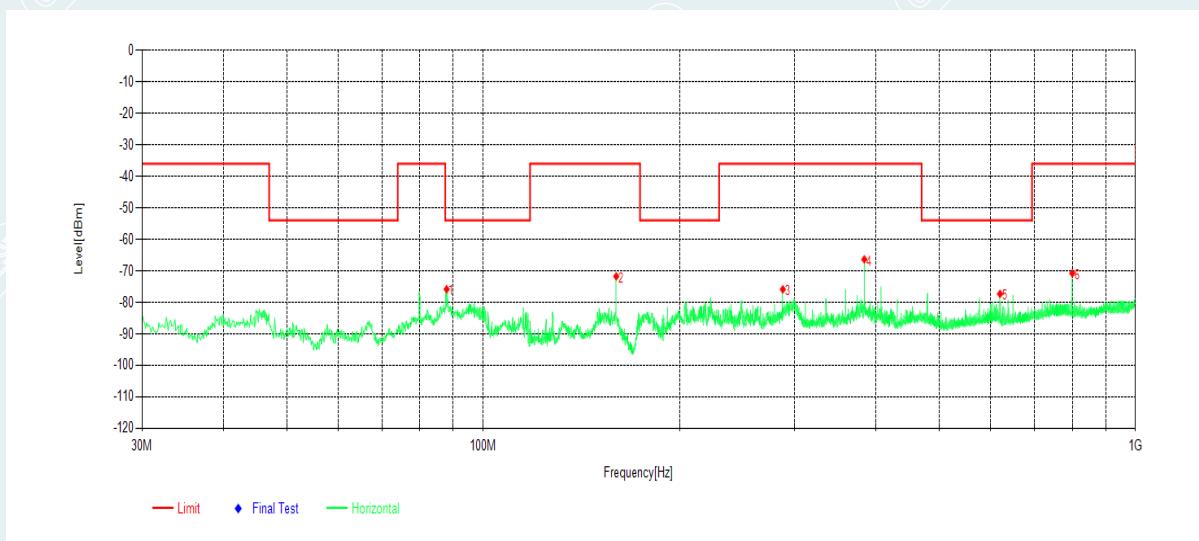
NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	43.871	-65.88	-79.66	-36.00	43.66	-13.78	RMS	Vertical
2	79.955	-54.60	-76.28	-36.00	40.28	-21.68	RMS	Vertical
3	95.96	-59.07	-78.38	-54.00	24.38	-19.31	RMS	Vertical
4	159.98	-54.96	-72.61	-36.00	36.61	-17.65	RMS	Vertical
5	208.577	-60.83	-78.39	-54.00	24.39	-17.56	RMS	Vertical
6	258.726	-61.08	-77.46	-36.00	41.46	-16.38	RMS	Vertical
7	1164.8	-65.09	-65.76	-30.00	35.76	-0.67	RMS	Vertical
8	1663	-66.24	-61.55	-30.00	31.55	4.69	RMS	Vertical
9	4806.675	-48.49	-50.23	-30.00	20.23	-1.74	RMS	Vertical
10	4959.75	-39.01	-39.91	-30.00	9.91	-0.90	RMS	Vertical
11	7441.125	-55.22	-50.30	-30.00	20.30	4.92	RMS	Vertical
12	12497.47	-69.90	-55.06	-30.00	25.06	14.84	RMS	Vertical

Power supply: AC 230V/50Hz(DC 48V/0.27A power by PoE Adapter)

30MHz-1GHz

Pre-scan all modes and recorded the worst case results(TX BLE_1M_2480MHz) in this report.

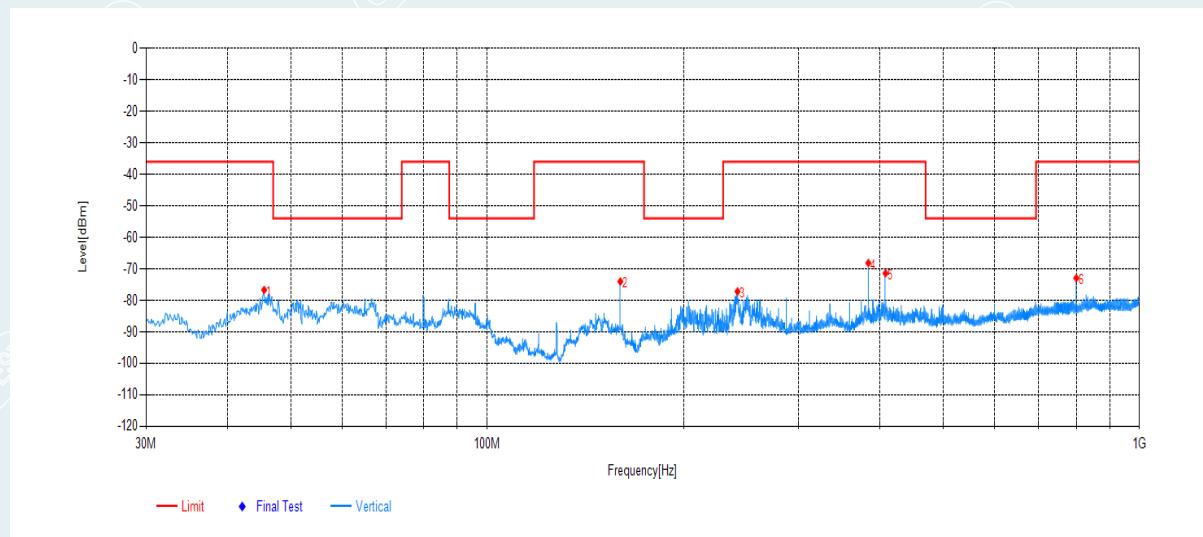
Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_1M_2480MHz	Voltage:	AC 230V/50Hz
Environment:	24.4°C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	87.909	-57.57	-75.85	-54.00	21.85	-18.28	RMS	Horizontal
2	159.98	-51.88	-71.76	-36.00	35.76	-19.88	RMS	Horizontal
3	288.02	-61.77	-75.91	-36.00	39.91	-14.14	RMS	Horizontal
4	383.953	-54.45	-66.38	-36.00	30.38	-11.93	RMS	Horizontal
5	619.76	-69.11	-77.34	-54.00	23.34	-8.23	RMS	Horizontal
6	799.986	-65.35	-70.82	-36.00	34.82	-5.47	RMS	Horizontal

Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	TX BLE_1M_2480MHz	Voltage:	AC 230V/50Hz
Environment:	24.4 °C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	45.52	-63.05	-76.73	-36.00	40.73	-13.68	RMS	Vertical
2	159.98	-56.37	-74.02	-36.00	38.02	-17.65	RMS	Vertical
3	241.945	-61.60	-77.20	-36.00	41.20	-15.60	RMS	Vertical
4	383.953	-55.53	-68.16	-36.00	32.16	-12.63	RMS	Vertical
5	408.009	-59.43	-71.42	-36.00	35.42	-11.99	RMS	Vertical
6	799.986	-67.56	-72.97	-36.00	36.97	-5.41	RMS	Vertical

6.6 RECEIVER SPURIOUS EMISSIONS

Test Requirement: ETSI EN300 328 V2.2.2/ 4.3.2.10

Test Method: ETSI EN300 328 V2.2.2/5.4.10.2.2

6.6.1 LIMIT

The spurious emissions of the receiver shall not exceed the values given in table 3.

In case of equipment with antenna connectors, these limits apply to emissions at the antenna port (conducted). For emissions radiated by the cabinet or for emissions radiated by integral antenna equipment (without antenna connectors), these limits are e.r.p for emissions up to 1 GHz and e.i.r.p for emissions above 1 GHz.

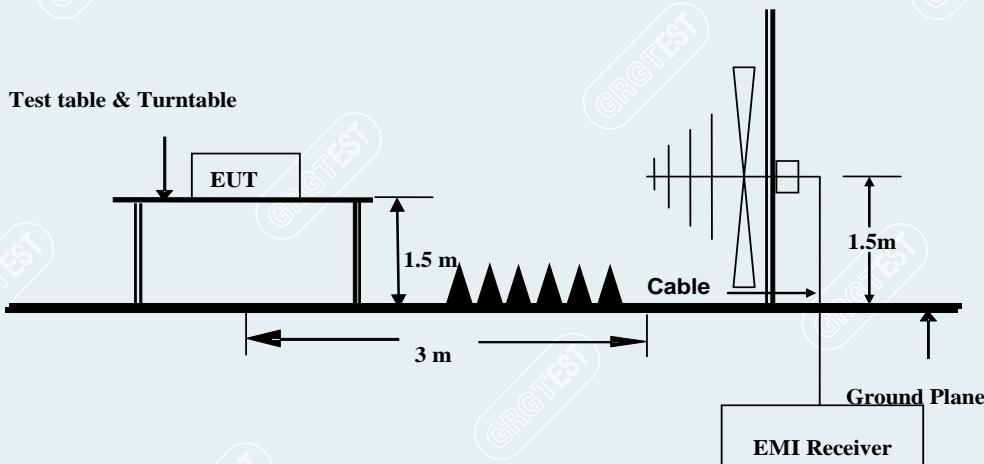
This device uses Radiated measurement.

Table 3: Spurious emission limits for receivers

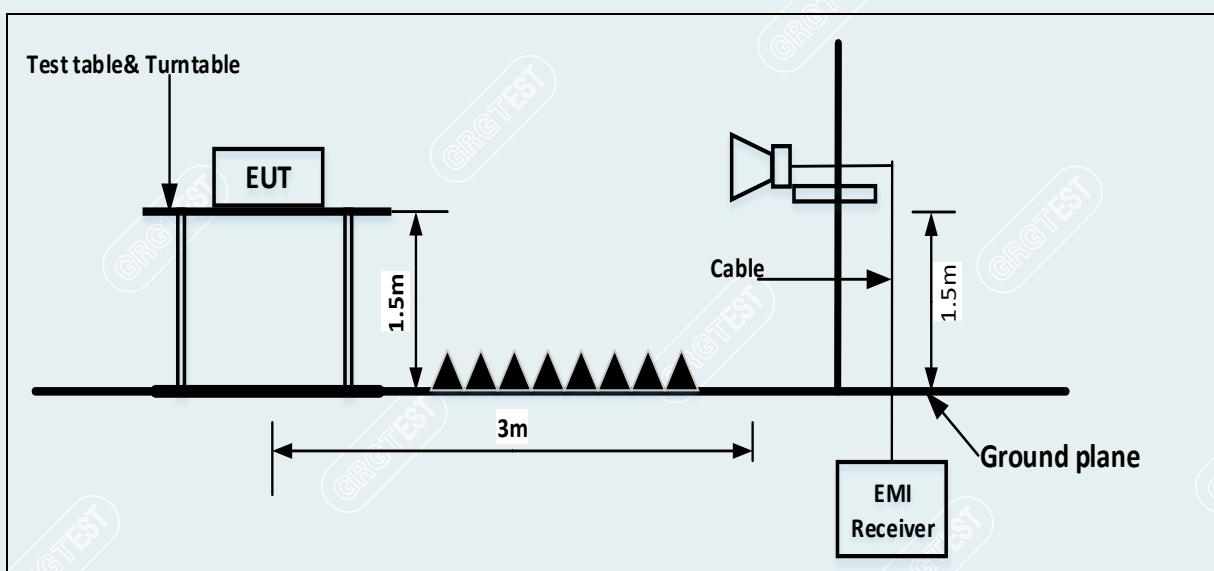
Frequency range	Maximum power	Bandwidth
30 MHz to 1 GHz	-57 dBm	100 kHz
1 GHz to 12,75 GHz	-47 dBm	1 MHz

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6.6.2 TEST CONFIGURATION 30MHz-1000MHz



1000MHz-12750MHz



6.6.3 TEST PROCEDURES

Test channel: Lowest channel, Highest channel

Test condition: Normal test conditions.

Test procedure: Test procedure is according to Clause 5.4.10.2.2 of ETSI EN 300 328 V2.2.2

Remark: /

6.6.4 DATA SAMPLE

Frequency [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
XXX	-58.02	-73.33	-57.00	16.33	-15.31	RMS	Horizontal

Frequency (MHz) = Emission frequency in MHz

Reading (dBm) = Uncorrected Analyzer / Receiver reading

Level (dBm) = Reading (dBm) + Factor (dB)

Limit (dBm) = Limit stated in standard

Margin (dB) = Limit (dBm) – Level (dBm)

RMS = Root Mean Square

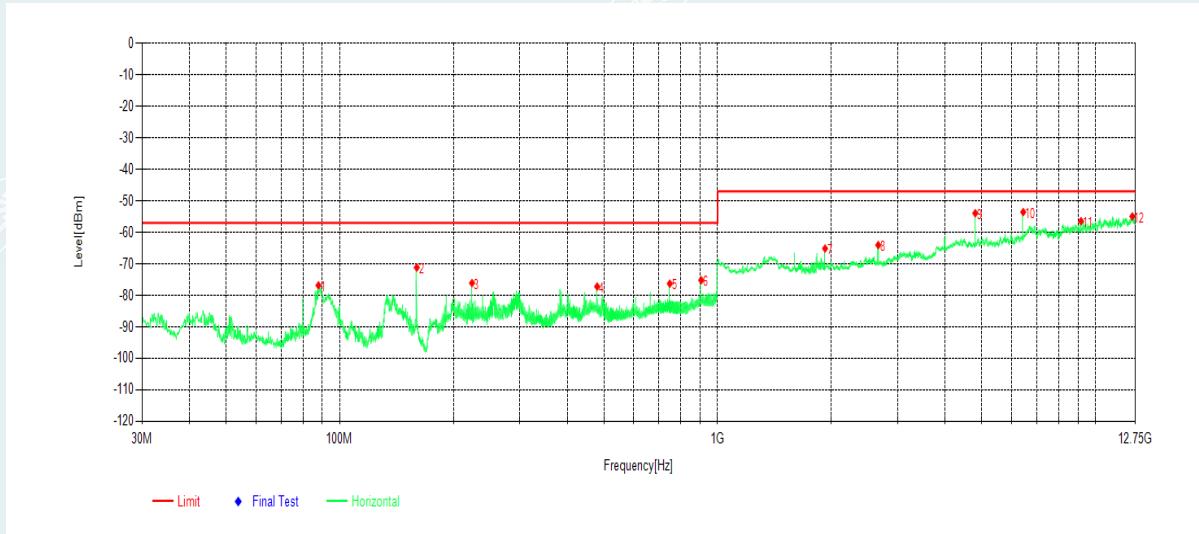
----- The following blanks -----

6.6.5 TEST RESULTS

Note: Pre-scan all modes, the worst power supply is AC 230/50Hz(DC 5V/2A power by Adapter) and recorded the worst case results(RX BLE_2M_2402MHz) in this report.

Power supply: AC 230V/50Hz (DC 5V/2A power by Adapter)

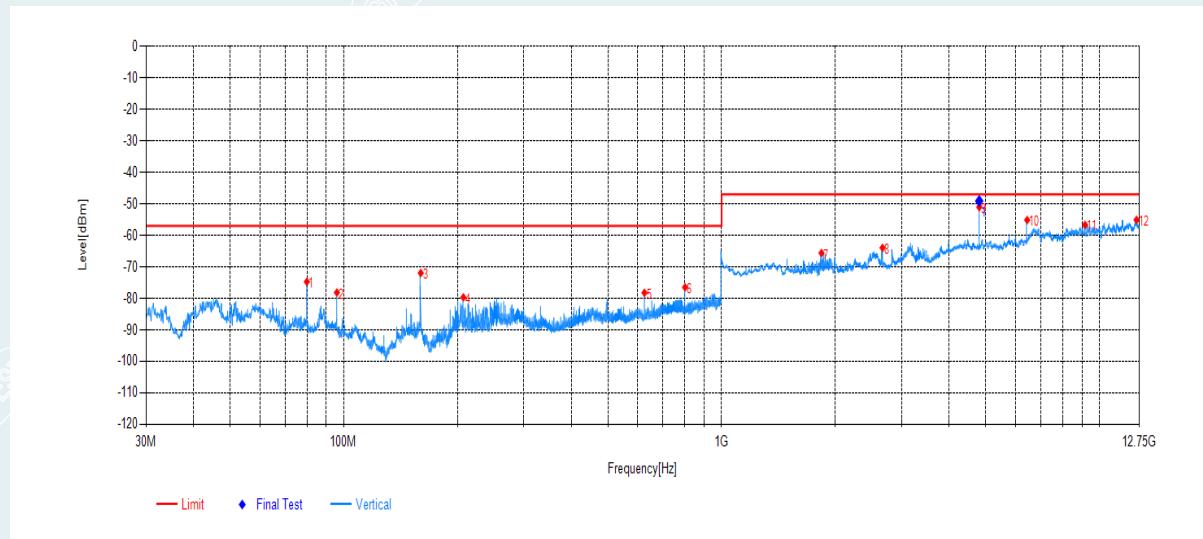
Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	RX BLE 2M_2402MHz	Voltage:	AC 230V/50Hz
Environment:	24.4°C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	87.909	-58.59	-76.87	-57.00	19.87	-18.28	RMS	Horizontal
2	159.98	-51.33	-71.21	-57.00	14.21	-19.88	RMS	Horizontal
3	224	-58.99	-76.15	-57.00	19.15	-17.16	RMS	Horizontal
4	479.983	-65.92	-77.25	-57.00	20.25	-11.33	RMS	Horizontal
5	747.024	-72.35	-76.31	-57.00	19.31	-3.96	RMS	Horizontal
6	904.649	-72.29	-75.21	-57.00	18.21	-2.92	RMS	Horizontal
7	1923.55	-53.01	-65.15	-47.00	18.15	-12.14	RMS	Horizontal
8	2660.275	-54.06	-64.04	-47.00	17.04	-9.98	RMS	Horizontal
9	4801.125	-51.93	-53.93	-47.00	6.93	-2.00	RMS	Horizontal
10	6432.025	-55.61	-53.58	-47.00	6.58	2.03	RMS	Horizontal
11	9146.275	-66.37	-56.46	-47.00	9.46	9.91	RMS	Horizontal
12	12499.72	-69.72	-54.94	-47.00	7.94	14.78	RMS	Horizontal

Project No	E20230331478001	EUT:	Hub M3
Model:	HM-G01E	Sample No:	E20230331478001-0004
Mode:	RX BLE 2M_2402MHz	Voltage:	AC 230V/50Hz
Environment:	24.4°C/44%RH/101.0kPa	Engineer:	Gong Xuan
Test Date:	2023-12-04	/	/



Suspected Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	79.955	-53.09	-74.77	-57.00	17.77	-21.68	RMS	Vertical
2	95.96	-58.88	-78.19	-57.00	21.19	-19.31	RMS	Vertical
3	159.98	-54.31	-71.96	-57.00	14.96	-17.65	RMS	Vertical
4	207.413	-62.12	-79.68	-57.00	22.68	-17.56	RMS	Vertical
5	624.998	-70.26	-78.28	-57.00	21.28	-8.02	RMS	Vertical
6	799.986	-71.12	-76.53	-57.00	19.53	-5.41	RMS	Vertical
7	1836.6	-52.96	-65.61	-47.00	18.61	-12.65	RMS	Vertical
8	2663.8	-54.13	-63.99	-47.00	16.99	-9.86	RMS	Vertical
9	4801.125	-49.27	-51.05	-47.00	4.05	-1.78	RMS	Vertical
10	6432.025	-57.18	-55.14	-47.00	8.14	2.04	RMS	Vertical
11	9147.45	-66.59	-56.66	-47.00	9.66	9.93	RMS	Vertical
12	12518.52	-69.75	-55.11	-47.00	8.11	14.64	RMS	Vertical

Final Data List

NO.	Freq. [MHz]	Reading [dBm]	Level [dBm]	Limit [dBm]	Margin [dB]	Factor [dB]	Detector	Polarity
1	4801.125	-47.29	-49.07	-47.00	2.07	-1.78	RMS	Vertical

6.7 RECEIVER BLOCKING

Test Requirement: ETSI EN300 328 V2.2.2/4.3.1.12 and 4.3.2.11

Test Method: ETSI EN300 328 V2.2.2/5.4.11.2.1

6.7.1 LIMIT

For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %.

For equipment that does not support a PER or a FER test to be performed, the minimum performance criterion shall be no loss of the wireless transmission function needed for the intended use of the equipment.

The blocking levels at specified frequency offsets shall be equal to or greater than the limits defined for.

Receiver Blocking parameters for Receiver Category 1 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 4)	Blocking Signal frequency (MHz)	Blocking signal power (dBm) (see note 4)	Type of blocking signal
(-133dBm+10 × log ₁₀ (OCBW)) or -68dBm whichever is less (see note 2)	2380 2504		
(-139dBm+10 × log ₁₀ (OCBW)) or -74dBm whichever is less (see note 3)	2300 2330 2360 2524 2584 2674	-34	CW

NOTE 1: OCBW is in Hz.
 NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
 NOTE 3: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 20 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.
 NOTE 4: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured positioned as recorded in clause 5.4.3.2.2.

Receiver Blocking parameters for Receiver Category 2 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking Signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139dBm+10 × log ₁₀ (OCBW)+10dBm) or (-74dBm+10dBm) whichever is less (see note 2)	2380 2504 2300 2584	-34	CW

NOTE 1: OCBW is in Hz.

NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 26 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

Receiver Blocking parameters for Receiver Category 3 equipment

Wanted signal mean power from companion device (dBm) (see notes 1 and 3)	Blocking Signal frequency (MHz)	Blocking signal power (dBm) (see note 3)	Type of blocking signal
(-139dBm+10 × log ₁₀ (OCBW)+20dBm) or (-74dBm+20dBm) whichever is less (see note 2)	2380 2504 2300 2584	-34	CW

NOTE 1: OCBW is in Hz.

NOTE 2: In case of radiated measurements using a companion device and the level of the wanted signal from the companion device cannot be determined, a relative test may be performed using a wanted signal up to P_{min} + 30 dB where P_{min} is the minimum level of wanted signal required to meet the minimum performance criteria as defined in clause 4.3.1.12.3 in the absence of any blocking signal.

NOTE 3: The level specified is the level at the UUT receiver input assuming a 0 dBi antenna assembly gain. In case of conducted measurements, this level has to be corrected for the (in-band) antenna assembly gain (G). In case of radiated measurements, this level is equivalent to a power flux density (PFD) in front of the UUT antenna with the UUT being configured/positioned as recorded in clause 5.4.3.2.2.

6.7.2 TEST CONFIGURATION

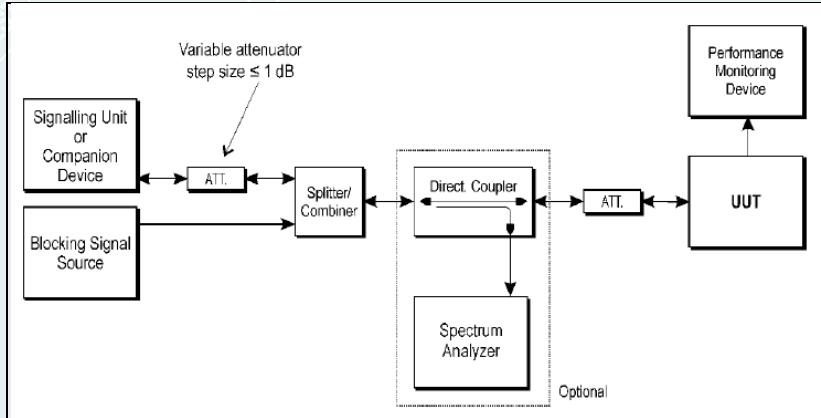


Figure 6.10-1: Receiver Blocking arrangement

6.7.3 TEST PROCEDURES

Test condition: Keep the EUT on the lowest and Highest channel working mode.

Test procedure: Step1:

Test condition: For non-FHSS equipment, the UUT shall be set to the lowest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 2:

The blocking signal generator is set to the first frequency as defined in the appropriate table corresponding to the receiver category and type of equipment.

Step 3:

With the blocking signal generator switched off, a communication link is established between the UUT and the associated companion device using the test setup shown in figure 6.

Unless the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the level of the wanted signal shall be set to the value provided in the table corresponding to the receiver category and type of equipment. The test procedure defined in clause 5.4.2, and more in particular clause 5.4.2.2.1.2, can be used to measure the (conducted) level of the wanted signal however no correction shall be made for antenna gain of

the companion device (step 6 in clause 5.4.2.2.1.2 shall be ignored). This level may be measured directly at the output of the companion device and a correction is made for the coupling loss into the UUT. The actual level for the wanted signal shall be recorded in the test report.

- When the option provided in note 2 of the applicable table referred to in clause 5.4.11.2.1 is used, the attenuation of the variable attenuator shall be increased in 1 dB steps to a value at which the minimum performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still met. The resulting level for the wanted signal at the input of the UUT is Pmin. This signal level (Pmin) is increased by the value provided in note 2 of the applicable table corresponding to the receiver category and type of equipment.

Step 4:

The blocking signal at the UUT is set to the level provided in the table corresponding to the receiver category and type of equipment.

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 are met then proceed to step 6.

Step 5:

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been increased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or

equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, step 3 and step 4 shall be repeated after that the frequency of the blocking signal set in step 2 has been decreased with a value equal to the Occupied Channel Bandwidth except:

- For the blocking frequency 2 380 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be decreased by 3 dB.

- For the blocking frequency 2 503,5 MHz, where this frequency offset shall be less than or equal to 10 MHz. If this frequency offset is more than 7 MHz, the level of the wanted signal shall be increased by 3 dB.

If the performance criteria as specified in clause 4.3.1.12.3 or clause 4.3.2.11.3 is still not met, the UUT fails to comply with the Receiver Blocking requirement and step 6 and step 7 are no longer required.

It shall be recorded in the test report whether the shift of blocking frequencies as described in the present step was used.

Step 6:

Repeat step 4 and step 5 for each remaining combination of frequency and level for the blocking signal as provided in the table corresponding to the receiver category and type of equipment.

Step 7

For non-FHSS equipment, repeat step 2 to step 6 with the UUT operating at the Highest operating channel on which the blocking test has to be performed (see clause 5.4.11.1).

Step 8

It shall be assessed and recorded in the test report whether the UUT complies with the Receiver Blocking requirement.

Keep the EUT on the lowest and Highest channel working mode.

If the equipment can be configured to operate with different Nominal Channel

Bandwidths (e.g. 20 MHz and 40 MHz) and different data rates, then the combination of the smallest channel bandwidth and the lowest data rate for this channel bandwidth which still allows the equipment to operate as intended shall be used.

Remark:

Test channel:

Lowest channel, Highest channel

6.7.4 TEST RESULTS

Test environment: Normal condition:
24.4°C/65%RH/101.0kPa

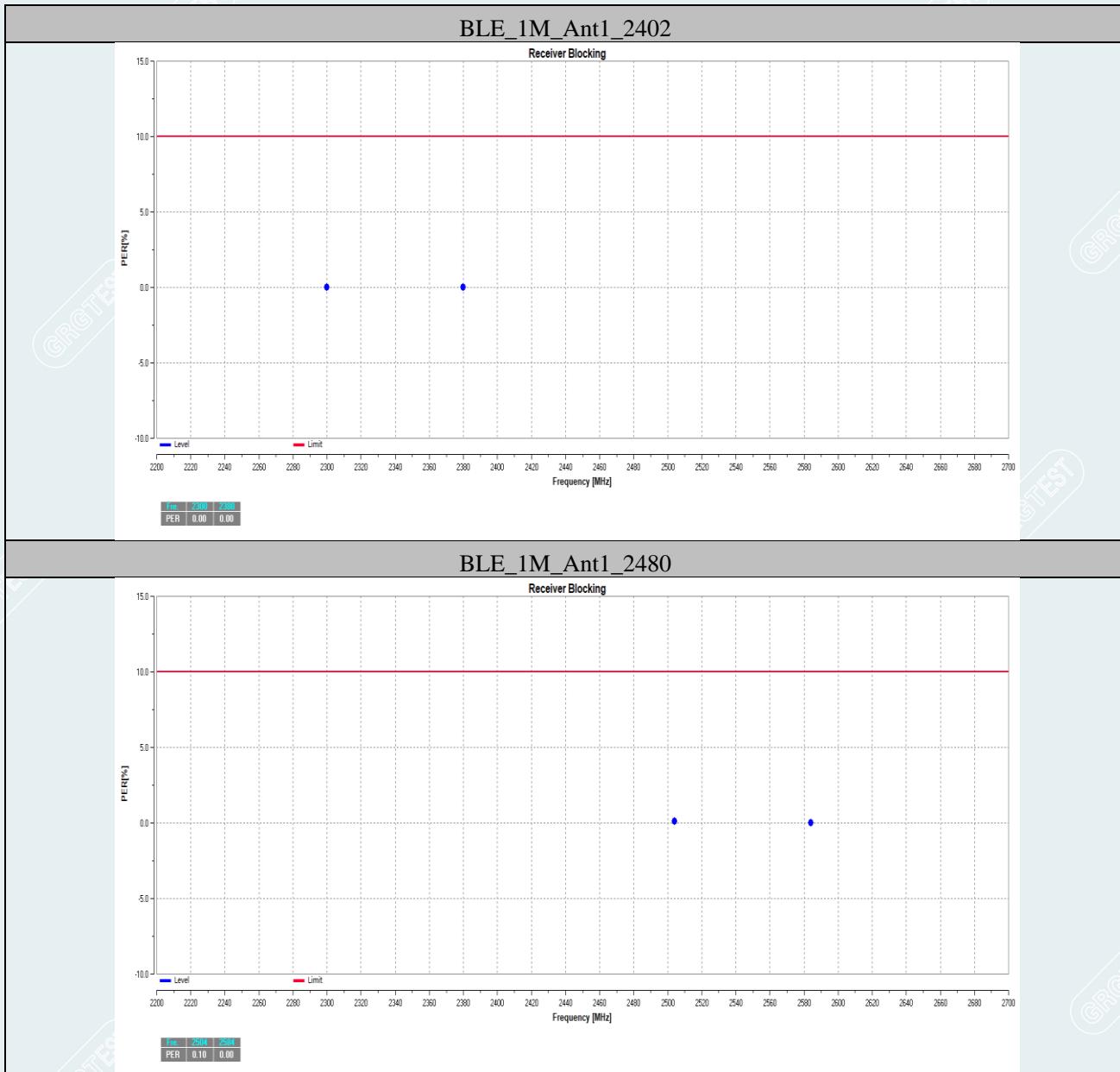
Test Engineer: Huang Tianmei
Test Date: 2023-12-01
Test Voltage: DC 5V

Test Mode	Frequency [MHz]	Wanted signal [dBm]	Frequency[MHz]	CW [dBm]	PER [%]	Limit [%]	Verdict
BLE_1M	2402	-69.37	2300	-34.5	0.00	≤10	PASS
		-69.37	2380	-34.5	0.00	≤10	PASS
	2480	-69.38	2504	-34.5	0.10	≤10	PASS
		-69.38	2584	-34.5	0.00	≤10	PASS

Remark: CW=signal power(-34dBm) + Antenna Gain(-0.5dBi).

----- The following blanks -----

Test screenshots



APPENDIX A. PHOTOGRAPH OF THE TEST CONNECTION DIAGRAM

Please refer to the attached document E20230331478001-28 CE-Test Photo.

APPENDIX B. PHOTOGRAPHS OF EUT

Please refer to the attached document E20230331478001-29 EUT photo.

----- End of Report -----